FORESTRY ABSTRACTS

VOLUME 14 1953 NUMBER 2

THE USE OF REPELLENTS FOR PREVENTING MAMMAL AND BIRD DAMAGE TO TREES AND SEED

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INTRODUCTION

THE interrelations between the different species of animals forming part of a forest community are but little understood and interference by man frequently has unfortunate results, e.g. the preservation of deer, accompanied by the destruction of large carnivores, may lead to deer becoming so numerous that they destroy the forest. While the conception of a natural balance between predators and prey is one that has been much abused, it can be fruitful, as in many cases of successful biological control of insect pests. Mammal pests may frequently be dealt with most effectively by destruction or mechanical exclusion, e.g. fencing, but there are many instances where the use of repellents is preferable.

It is often difficult to decide the precise mode of action of a particular repellent used in the field, where shy or nocturnal animals are not readily observed, and any of the sense organs may be the repellent receptor. By way of definition it may be said that the term 'repellent' should properly be confined to objects or chemicals in some way offensive to the attacker, i.e. that repel or deter him rather than offer him a mere physical barrier or act as a *lethal* poison. It includes therefore all types of scares, and obnoxious colour, touch, taste or smell but *not* fences or other mechanical impediments. Electric fences, which are essentially repellent in action, have already been dealt with in a previous article, 'The Electric Fence in Forestry' *For. Abstr.* 9 (2), 1947 (139–42). The properties of a good repellent are that it should be cheap, easy to apply, remain effective throughout the season of attack and not injure the tree or seed. Although volatile substances were among the first to be used as repellents, for field use a repellent should be relatively non-volatile, and insoluble in water.

There are many gaps in the literature on repellents, e.g. no publications have been traced on the use of repellents against damage by monkeys and remarkably few studies exist on bird damage and repellents. There is also a regrettable paucity of published data on the comparative costs of repellents and on their efficiency in different climates. A repellent that is used successfully at one place and time may not be so effective under different conditions, e.g. work in the U.S.A. on cottontail rabbits [2, 23, 46, 82, 83] has shown that their diet differs from place to place and is determined by available food, and possibly also by local or individual preferences. A heavy fall of snow will make some herbage unavailable and cause rabbits to seek other food.

No forest student of repellents can ignore the large amount of laboratory and field experimental work done, under the stimulus of war, during the last ten years. Most of this work is American and was not planned with the needs of tree and seed protection in mind, but rather with the prevention of rodent damage to stored food. However, about 4000 substances have been systematically tested, chiefly against captive rats, and some of the more promising materials might be of use in forestry. Naphthalene has long been recommended for the protection of stored seed and clothing from rats and mice [34, 36, 66, 77] as have paradichlorbenzene, sulphur, nicotine sulphate, oil of citronella, coal tar, oil of Cassia, oil of Bergamot and a variety of other substances [62, 70].

The use as repellents of the natural odours of mammals that prey on rodents (chiefly Mustelids) has frequently been suggested, and Ford and Clausen [33] found that the active ingredient of skunk and mink odour, *n*-butyl mercaptan, when placed on the food of caged white rats made them nervous and excited. At first the food was avoided until the mercaptan had volatilized but after some months the rats became less sensitive to the smell. Animal feeding-stuffs on a farm were protected from rats for four months by a mercaptan/honey preparation.

* The views expressed in this article are those of the author, and reference to trade names and proprietary products carries no Ministerial endorsement.

During the war micro-crystalline waxes used to waterproof packaged food were found also to deter rodent attack [53]. In order to evaluate the very large number of substances considered to be potentially repellent, a biological-assay procedure was devised [12, 13, 98] based upon the degree of acceptability to rats of foods containing trial repellents. The more promising materials were then incorporated in sheets of cardboard used as barriers separating a caged test rat from its food goal [13, 14, 26, 80, 81, 98]. The rats had been trained to eat through untreated barriers in order to reach their food and the time taken to penetrate a treated barrier was used as a measure of its repellency; for difficult barriers it was necessary to use several rats. The most promising materials from these tests were applied to small experimental fibre-board boxes (by impregnation, dusting on to a sticky surface, coating, wrapping or calendering) and then exposed to wild or semi-wild populations of rats [67, 89, 97, 98, 99]. Testing is confused by the fact that a rat may gnaw through an obstruction without eating it, so that poisonous or unpalatable substances are not necessarily deterrent. Among repellents that proved most promising by these tests are actidione [28, 50, 89], Zn dimethyldithiocarbamate-cyclohexylamine and tetramethyl-thiuramdisulphide [97]. The most recent tests [99] have been made with repellents incorporated in a flexible vinyl plastic film, used as a wrapper; that containing a trinitro-benzene complex gave the best results.

Since the problems of preventing mammals and birds from damaging forests and orchards are interrelated, experience in both habitats will be considered here, for the benefit or both foresters and horticulturists.

Deer

Forest Trees

In Germany the popularity of hunting and the consequent encouragement of game makes inevitable a great deal of forest damage. This has led to much testing of methods of tree protection, particularly against deer.

The Hann. Münden School of Forestry has made a special study of repellents and Heuell [42] has divided them into those that protect either a whole stand (e.g. by the distribution of repellent-soaked rags) or individual trees. He lists protection of single trees as (*a*) *mechanical*, by tying the lower branches against the trunk, the use of netting, or the protection of leaders by metal caps; (*b*) *mechanical-biological*, artificial roughening of the bark with a scraping tool to make it unpalatable to deer; (*c*) *chemical-biological*, aimed at stimulating cork production, as by applying acids; (*d*) *chemical*, painting or spraying repellents. There is little information about the efficacy of distributing repellent-soaked rags, though Huber [48] suggested 'Demarkol' (Organa-Anorgana Tar Distilleries, Bochum). Deer are known to dislike rough or sticky bark and Bromée [16] wrote that in Sweden, Spruce, Silver Fir and Douglas Fir were made distasteful by stimulating resin production. The bark was removed in patches to about half its thickness with a special 'bark plane', just before or at sap flow; five years' protection was claimed. There has been little success so far with the chemical-biological method [42].

Traditional repellents of the chemical sort are popular with German foresters [31] and one used by the Royal Bavarian Forest Academy against red deer (*Cervus elaphus*) is 1 part $Ca(OH)_2$ to 5 parts fresh cow dung, mixed with water to a thin paste. This was also applied to the terminal buds of Norway Spruce against white-tailed deer (*Odocoileus virginianus*) in Connecticut by Weiss [94]. He found damage to be greatly reduced and bud development unretarded. Preparations of wood tar or coal tar have been used for many years, usually applied in strips so as not to cover the entire stem and clog the lenticels. Painting young Oak and Ash stems with a tepid mixture of 12 parts coal tar, 1 part Na_2CO_3 and 2 parts ox blood was stated to be effective for 15 years [16]. Aluminium sulphate has been suggested as a repellent [5] because it has been used with some success against rabbits [4]. Numerous repellents are listed by Heuell [42], for example (*a*) Höchst Neu (I.G. Farbenindustrie) sprayed on trees was said to protect them for two years and cause no injury, although other workers dissent [32]; (*b*) Cervidon 1 (Avenarius, Köln), a bituminous preparation that can be painted or sprayed, has given variable results; (*c*) Beech tar gave 4 to 5 years' protection to Spruce but some trees were damaged by it; (*d*) coal tar proved more difficult to spray than the thinner wood tar but adequately protected Alder, Oak and Beech for about 3 years; some treated Spruce suffered damage by deer; (*e*) Sinoxyd F (Firma Sachs, Marburg), a bituminous emulsion containing a substance said to be distasteful to animals, protected Beech and Spruce for 5 years. Türcke [90] wrote that Sinoxyd F forms a mechanical coating over the trunk that dries and hardens quickly and is resistant to temperature and rain. It does not seal the lenticels and remains effective 6–10 years.

Fruit Trees

Repellents have been used in the U.S.A. since 1926 with variable results under different conditions [15]. Damage to young orchards is greatest in the growing season and to old ones in autumn and

early spring. Increase of deer (*Odocoileus virginianus*) in recent years has stimulated interest in repellents and many experiments have been tried with a substance (Zn-dimethyldithiocarbamate-cyclohexylamine complex, made by Goodrich Chemical Co.) found efficacious for vegetable crops [10]. Powell [71] reported successful protection of Apple orchards with this substance, using an adhesive, polyethylene polysulphide, against washing off by rain, whence its recent abbreviation to z.i.p. Deer were said to chew treated leaves, show dislike for the taste and then avoid them. It is necessary to respray as new growth appears. Welch [95] reported experiments in various parts of U.S.A. in which both z.i.p. and Diamond 'L' (a Leckenby Co., Seattle, product) reduced deer damage to fruit trees in both the growing and dormant seasons. He found the repellents to be most effective when natural browse was available. Thompson and Keener [85], also using both z.i.p. and Diamond 'L', found them effective for six weeks when sprayed in the growing season, but neither repellent prevented heavy damage in late October, rain and snow apparently washing them off. Welch [95] and other workers [47] investigated the effect on the foliage of fruit trees of various proprietary sprays (including z.i.p. and Diamond 'L') and observed no ill-effects with any.

Rabbits and Hares

Forest Trees

Bitter tasting substances such as aloes and quassia, popular in many home-made repellents, were said to be useless against rabbits (*Sylvilagus* spp.) by Rockwell [73] who also considered that coal tar, pine tar, tarred paper and oils may be injurious to young trees. Many repellent sprays were found not to give protection throughout the winter, but a compound similar to that manufactured for the U.S. Fish and Wild Life Service (containing rosin, asphalt emulsion, $CuSO_4$, $CuCO_3$ and lime-sulphur, with $C_2H_4Cl_2$ as a solvent and called 96a) was recommended as doing so. The same dark-coloured type of repellent was advised [64] for 2 + 1 Red Pine transplants against snowshoe hares (*Lepus americanus*). Although spray applied just before autumn planting gave protection against hares until the trees were covered with snow, injury was sometimes caused by the repellent over the winter, and trees planted and treated in the spring survived better than those treated in the autumn. Heat absorbing (dark) sprays were found to cause some needle injury during hot weather.

Various proprietary repellents (including z.i.p.) recently tested in Sweden [69], were found to afford inadequate protection against damage by rabbits and hares.

Aldous and Aldous [1] recommended (unspecified) repellent sprays for transplants in nursery beds and for over-winter protection against snowshoe hares but cultural practices such as planting during the low period of a local hare cycle and away from cover were stressed. Rags soaked in repellent solutions are sometimes suggested [48] but experience with British commercial products for bolting rabbits (*Oryctolagus cuniculus*) from their burrows leaves the writer sceptical of their success.

Fruit Trees

Cottontail rabbits (*Sylvilagus* spp.) and black-tailed, white-tailed and snowshoe hares (*Lepus* spp.) have all been reported as attacking the bark of growing trees and shrubs in North America and many repellents have been tested there over the past 20 years. Harvey [41] praised sulphurized oil and Neilson [3, 68] found that rosin and linseed oil in the proportion of 5 : 1 gave protection but caused injury to Sweet Cherry and Peach trees.

Following on Neilson's work, Cardinell, Toenjes and Hayne [18] tested over 200 substances, using cottontail rabbits in pens. They found that trees sprayed with rosin + linseed oil showed restricted growth. The first repellent found to be safe and effective was a mixture of rosin 7 lb. and ethanol 1 gallon (rosin-ethanol). A single application made in the autumn gave protection to trees throughout the winter. This preparation has since been widely recommended [4, 30, 40, 87]. Further tests by Cardinell and Hayne [17] endorsed the efficiency of rosin-ethanol, and also of the U.S. Fish & Wild Life Service compound No. 96a and four U.S.A. commercial products.

Garlough, Welch and Spencer [37] claimed that several repellents were effective against both *Sylvilagus* and *Lepus* spp., but only one of these mixtures, since modified to 96a, is among the best half-dozen of those tested by Cardinell and Hayne. Investigations carried out in Canada [55] have confirmed the value of compound 96a and rosin-ethanol as rabbit repellents. Recent tests by Baumgartner and Powell [10] of the commercial deer repellent z.i.p. have shown promising results, and they claim this substance to be an effective rabbit repellent.

One of the few statistically planned trials (in England by Coker [19]), using bundles of Cox's Orange Pippin shoots, showed that compound 96a gave significantly better results than z.i.p. and another commercial deer repellent, although in later tests of phytotoxicity it slightly delayed callus formation

on wounds made and treated late in the dormant season. A further field test by Thompson and Armour [86] using Apple rootstocks in randomized blocks showed that rosin-ethanol, bone oil (a persistently aromatic fluid obtained by the destructive distillation of bones, supplied by Victoria Chemical Works, Lincoln) and 96a, in that order of efficiency, gave considerable protection against the European rabbit; z.i.p. gave no protection at all, being apparently washed off by the rain.

Rats, Mice and Other Small Mammals

Forest Trees

There are very few references to damage to the forest by rats and mice, though such damage, e.g. in certain tropical countries, may be severe in young plantations. Damage to quite old Scots Pine and Douglas Fir in U.S.A. by voles (*Microtus pennsylvanicus*) may be so severe [63] that some trees get thrown by the gnawing through of their lateral roots. In South Africa [25] the vlei rat (*Otomys irroratus*), the striped field mouse (*Rhabdomys pumilio*) and other rodents, ring-bark established Pines and Cypresses, but destruction of cover rather than the use of repellents is recommended as a preventive measure.

For Rubber trees, Beeley [11] used a preparation of linseed oil, castor oil and powdered rosin with success. Another worker [8], in Uganda, used coal tar against rodents by painting the butts of trees in Cypress plantations with good effect. Watson [93] records that in Cyprus, rats (*Rattus rattus*) remove strips of bark from Carob trees and eat the cambium layer. Rat destruction rather than the use of repellents was suggested.

Although the damage to bark and foliage caused by porcupines (*Erethizon* spp.) in U.S.A. is spectacular [20, 21, 22, 45, 79, 84] few factual data exist and it is difficult to assess the importance of the pest. Repellents have seldom been used, but Welch [96] found that, in pen tests, sticks of Ponderosa Pine were effectively protected by Cu naphthenate (1 lb. to 3 pints of mineral spirits), NH_4 thiocyanate (10% solution), pentachlorophenol (5% in penetrating oil) and repellent 96a. No field tests were carried out on trees, but Cu naphthenate was found to be the most satisfactory for protecting wooden structures from porcupine damage.

There are many references to squirrels (*Sciurus* spp.) damaging the bark and shoots of trees, but no work appears to have been done on repellents.

Fruit Trees

Orchards are frequently damaged by mice and mouse-like rodents, which burrow in the mulch round the base of the trees and cause injury below soil level. Rosin-ethanol is recommended against voles (*Microtus* spp.) [49] but is said not to repel field mice [29] and most reliance is placed on poisoning [29, 65, 88].

Seed

Wherever direct sowing, whether broadcast or in spots, strips etc. is accepted silvicultural practice, losses due to rodents and birds are frequently the main cause of failure. It was rodent depredations that caused the direct sowing of Douglas Fir to be abandoned in the U.S.A., early in the twentieth century [56]; but the rise in the cost of planting [38] has again stimulated interest in direct sowing. In a fully documented survey for the U.S.A., Smith and Aldous [78] incriminated 44 small mammal and 37 bird species as coniferous seed eaters. The mammals chiefly involved are chipmunk (*Eutamias* spp.) [44, 76, 78, 101], red squirrel (*Tamiasciurus* spp.) [76, 78], white-footed deermouse (*Peromyscus* spp.) [6, 44, 56, 76, 78, 101], brown squirrel (*Citellus* spp.) [78], vole (*Microtus* spp.) [56], harvest mouse (*Micromys* spp.) [7] and the shrew (*Sorex* spp.) [78]. There is general agreement that individual deermice eat 2–300 Douglas Fir seeds daily [6, 38, 101] so that at 50,000 seeds to an acre, only 80 mice would be needed to clear such an area in two or three days.

It has long been known that small-seeded species are less liable to loss by rodents [58, 72, 75] and Horn [44] showed that mice and chipmunks preferred large coniferous seed to small—even, it may be noted, when the seeds were ground to a paste.

Attempts at the total elimination of rodent pests from sowing areas have generally failed. Garman and Orr-Ewing [38] and Horn [43] found that burning does not eliminate mice, which either survive in roots or stream banks, or are rapidly replaced by immigration. The use of wire screens ($\frac{1}{4}$-in. mesh) in the form of cones is highly recommended [38, 57, 78, 101], but costly. Poisoning, trapping, shooting and control by natural predators have seldom reduced the pests sufficiently or for long enough to allow satisfactory germination and growth [78] but Tl_2SO_4 [58, 69, 74], and Na fluoroacetate [59] have given good results and the newer poisons have yet to be fully tried. That this may not

be the correct approach, however, was suggested by the work of Graham [39] who claimed that mice and shrews destroyed 50–80% of the prepupae of the Larch sawfly (*Pristiphora erichsonii*), compared with 10% killed by parasitic insects or fungi. Other workers [60, 91] have confirmed that small mammals are the most important factor in the natural control of sawfly. Because of the possible beneficial activities of small mammals, and the difficulty of adequately reducing their numbers, the use of repellents merits further investigation. Naphthalene has been recommended as a mouse repellent for stored seeds [36, 77], but was found ineffective for sown seed [38, 78, 101]. Applications of red lead, sulphonated linseed oil, quassia chips, creosote, z.i.p. and some 30 other distasteful substances have all failed to protect seed in Canada and U.S.A. [6, 38, 59, 76, 101]. Some repellents, e.g. tetramethylene disulphotetramine, reduce viability [9]. Beeley [11] recommends a mixture of linseed oil, castor oil and powdered rosin for protection of Rubber tree seeds.

The practice of pelleting seed has offered new scope for the employment of repellents. Willis [101] in cage tests with deermice found that seeds enclosed in a pellet of flour paste containing tannic acid, red pepper and belladonna were uneaten, but he did no field tests, believing that seeds thus coated would take too long to germinate. Recently this line of research has been taken up again [38, 61, 92] and pellets are said to improve the keeping qualities and germination of seed and to reduce rodent attack, even without the addition of repellents [38, 61]. The evidence, however, is conflicting since, in laboratory studies, white rats have been found to break up pellets to get the seed, and rats in the field may collect pellets and eat the seed readily [92]. Seeds may be coated in two ways, either with many thin coats, or with one thick layer. The first method is used for single seeds and the second for smaller multiple seeds. For the first method, machinery for making medical pills has been adapted, alternate applications of adhesive and dust being made. The coating particles must be smaller than the seed otherwise the seed will coat them. Basic materials are felspar, china-clay and the ash from steam-boiler tubes, with Na carboxymethyl cellulose as adhesive. Fertilizer, fungicides and insect- and rodent-repellents are added to the coating. Lime-sulphur, Cu naphthenate and *n*-butyl mercaptan have been incorporated in pellets and give protection in some but not all instances.

Birds

Forest Trees

Although some birds do considerable damage, for example, capercailzie and blackgame peck buds and many gregariously roosting species apparently make trees stagheaded, repellents do not seem to have been used to reduce such damage.

Various scaring devices are resorted to [52], such as the firing of guns (either loaded or blank), the use of strings of blank cartridges exploding at intervals, Roman candles or flash-guns (a device, suspended by a flexible spring, which periodically explodes a mixture of acetylene gas and air), but critical evaluations are lacking.

Fruit Trees

Birds, particularly sparrows, finches and tits sometimes cause extensive and serious damage to fruit trees and shrubs by pecking out the buds, particularly flower buds [35], while ripe fruit suffers considerably from blackbirds, starlings, thrushes and other species. Shooting is an effective but costly means of control; numerous bird-scaring devices, based on noise or glitter (e.g. 'Spirolum', made by Dazians Inc., Chicago), are in use, and various sprays have been tried, but no effective repellent appears to have been developed.

Seed

Although not generally considered to be as destructive as rodents, many birds feed on the seeds of coniferous trees, both when shed naturally and when planted by man. Shirley [76] has caught seed-eating birds in traps baited with seed, and Smith and Aldous [78] list 37 species among which the most frequently incriminated are grouse (*Dendragapus* spp.), Eastern mourning dove (*Zenaidura macroura carolinensis*), jays (*Cyanocitta* spp.), blackbirds (*Euphagus* spp.) and juncos (*Junco* spp.).

The first efficient bird repellent to be used on seeds is said to have been red lead [78] and it was used and recommended by Robertson [72]. Other workers [24, 76], however, have found it of little use, in common with sulphonated linseed oil, terpene mercaptan, naphthalene, kerosene, coal tar and various commercial compounds. Recent work on coloured rodent baits by Kalmbach [51] and Kalmbach and Welch [54] suggests that advantage might be taken of the visual acuity of birds when trying to prevent them from eating seeds. Whereas rodents are either actually or very nearly colour

blind and pay little or no attention to the colour of their food, birds avoid unnaturally coloured foods. The greatest aversion is shown by birds to colours near the centre of the humanly visible spectrum—yellow and green—and the dyeing of seeds with these colours should make them effectively repellent. Thus Weatherby [100] reports that bitter coatings did not prevent blue grouse (*Dendragapus obscurus*) from causing high seed and seedling losses in British Columbia but that spraying with bright yellow paint reduced losses by 50% or more. Less satisfactory results were obtained by Dambach and Leedy [24] who found ring-necked pheasants to be attracted by some green-coloured 'repellents'. There is clearly a need for more work on this subject.

Conclusions

It is difficult, in a subject so little studied by truly critical standards, to give specific guidance to the field officer. Nevertheless, despite the results obtained by different workers not always being consistent, the general lines of approach and the substances showing most promise may be indicated.

Laboratory Studies

The systematic testing of thousands of substances, chiefly against captive rats, has indicated that the following repellents are the most promising; cycloheximide (actidione), Zn dimethyldithiocarbamate-cyclohexylamine (z.i.p.), tetramethyl-thiuramdisulphide, a trinitro-benzene complex and *n*-butyl mercaptan. Great claims have been made for actidione, but it is, unfortunately, highly toxic to animals, water-soluble, and very expensive; related compounds are being investigated.

Deer

Stimulation of conifers to produce more resin, by removing patches of bark, appears to be a fairly cheap and effective method of protection against deer. There are many advocates of simple traditional repellents such as slaked lime and cow dung, although critical evaluation of their efficiency is scanty and inconclusive. Much is claimed for various tar preparations, and although there seems to be considerable risk of tree injury, either directly or by increased heat absorption, the lengthy protection claimed by some workers (five years or more) should be a stimulus to further research. Z.i.p. and other commercial deer repellents have been effective in orchards, but appear to be washed off by rain; if combined with a more efficient adhesive they might prove satisfactory for forestry use.

Rabbits and Hares

The painting of rosin-ethanol (rosin dissolved in alcohol) on fruit trees is a valuable preventive, as also are bone oil and the U.S.F.W.S. compound 96a, though the last may injure the tree. Rosin in linseed oil, while highly effective, appears to be too injurious to trees.

Rats, Mice and other Small Mammals

Poisoning and the destruction of cover are the most favoured methods of dealing with rodents attacking trees, but rosin-ethanol is worth trying against voles (not mice), and Cu naphthenate against porcupines. It is not easy to control the numbers of seed-eating rodents and, because of their possible beneficial activities, it is desirable to investigate repellents further. The inclusion of a repellent in pellets containing fertilizers and fungicides as well as seed, appears a promising line of development.

Birds

Current scaring devices have not been subjected to any real measure of critical evaluation and choice seems to depend largely on custom or individual prejudice. The possibilities of repellent coloration (of seeds, buds etc.) merit further investigation.

General

Supplementary feeding is sometimes practised to divert hares, rabbits or deer from seedling and old trees. Since this may result in more animals being attracted to the area, it is of questionable value. Excessive multiplication of game should certainly be avoided and the provision of a variety of alternative food plants, such as wild fruit trees, might reduce damage to forest stands. It has been suggested by Duschek [27] that an investigation of the nutrient material present in bark, and possibly no longer available from other forest plants under conditions of monoculture, might yield information of value.

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ABSTRACT SECTION

0. FORESTS, FORESTRY, AND THE UTILIZATION OF FOREST PRODUCTS: GENERAL

For general *regional* accounts see section 90

0 (048.1). BIBLIOGRAPHICAL LISTS

See No. 1698.

0 (052/054). PERIODICALS

930. ***Tree Planters' Notes.*** Forest Service, U.S. Department of Agriculture, Washington, D.C. At irregular intervals; No. 1 issued Nov. 1950, Supplied on request to persons and organizations doing reforestation work, and to libraries, forest schools etc. Abbreviation in *For. Abstr.: Tree Plant. Notes.*

0 (084.3) MAPS

See also Nos. 947–9, 1067, 1082, 1087, 1824.

931. **[Map of] The Hashemite Kingdom of the Jordan: areas controlled by Department of Forests.** Department of Lands and Surveys of the Jordan. 1951–2. Two sheets. Scale 1: 250,000. I.F.B.

932. **Map of New South Wales showing organizations, projects and works for water, soil, and forest conservation.** *Appendix B* to *Rep. Dep. Conserv. N.S.W. 1950/51*, 1952. Scale 1:1,000,000.

0 - - 011. TERMINOLOGY. NOMENCLATURE

See Nos. 1010, 1338, 1482, 1500, 1694.

0 - - 015. MATHEMATICS. STATISTICAL METHODS

See also Nos. 1120–2, 1195, 1403 *et seq.*, 1480.

933. JEFFERS, J. N. R. **The use of statistical methods in forest research.** Forestry Commission, London. 1952. pp. 10. 21 refs.

934. NAIR, K. R. **Statistical methods in forest research.** Forest Research Institute, Dehra Dun. 1952. pp. 8. 20 refs. (6th British Commonwealth Forestry Conference, Canada, 1952).

Reviews the application of statistical methods to forest research in India during the last 20 years.

935. WICHT, C. L. **Methods of field experimentation in forestry.** Government Printer, Pretoria. 1952. pp. 13. 13 refs. (6th British Commonwealth Forestry Conference, Canada, 1952.)

A brief discussion of the outstanding difficulties of field experimentation in forestry is followed by summaries of four procedures which might be used to investigate thinnings in the field. These are: replicated experiments of standard design, correlated curve trend experiments based on O'Connor's graphical method, experiments with co-ordinated treatments relying on the fitting of regressions to permit interpretation, and investigations in the field of a mathematical expression of the relationship between tree growth and growing space developed by Cilliers and van Wyk. *From author's summary.*

0 - - 087. APPARATUS, INSTRUMENTS, MACHINERY: GENERAL

936. ALLOUARD, P. Quelques nouveautés intéressantes pour les forestiers (Foire de Paris 1951). **[Some new equipment of interest to foresters (Paris Fair 1951).]** *Bois For. Trop.* No. 20, 1951 (264–8). [F.]

Notes on Ercs and Manox lift trucks; the Virvolt self-propelling truck; the Collet tree planter [cf. *For. Abstr.* 13 (No. 283)]; the Tirfor light winch; the Attila brush cutter and the Dobbins flame thrower.

937. **Equipment news.** *Unasylva* 6 (2), 1952 (82–5).

Descriptive notes with photographs of the following, amongst others:—Latil Tractor type TL (S.A. Latil, 8 Quai Galliéni, Suresnes, Seine); Reliance Dual Purpose trailer (Reliance Trailer and Truck Co. Inc., 2765 Sixteenth Street, San Francisco 3, Calif.); Slide for hauling pulpwood (U.S. Forest Service, Southern Forest Experiment Station, Crossett, Ark.); the "Timber Wolf" straddle carrier [cf. *For. Abstr.* 13 (No. 2582)]; Staffa 2/3-ton mobile crane (Chamberlain Industries Ltd., Staffa Works, Leyton, London, E.10); Hayter rotary grass cutter (Hayters Ltd., Spellbrook, Bishop's Stortford, Herts.); lightweight scaling ladder (BEGA Constructors, 54 Avenue du XX^{e} Corps, Nancy); Hedden Metal Detector, Model DC-II (Hedden Metal Detectors, 2329 Liberty Avenue, Pittsburgh 1, Pa.); Tyson patent self-loading and ejecting woodturning lathe (British Industrial Designers, Cavendish Chambers, Keighley, Yorks.); and the Master electric portable 6¼-in. circular saw (Master-Taper Co., 4531 N. Beacon St., Chicago 40, Ill.).

938. **Equipment news.** *Unasylva* 6 (3), 1952 (136–9).

Descriptive notes with photographs of the following, amongst others:—Forbes Kwik-cut saw, a light portable machine for pruning and cleaning (Gail and Scott Ltd., 5 Drapers Gardens, London, E.C.2); Rohr skidding wheels (Ernst Rohr, Staufen-Lenzburg Switzerland); P.T.I. sharpening attachment, by which blades are sharpened in sections with a grinding wheel rotating in the same plane as the blade (P.T.I. Inc., 401 Broadway, New York 13); Renault power winch, Pan Model BT 5 [cf. *For. Abstr.* 11 (No. 394)] (Régie Nationale des Usines Renault, Billancourt (Seine), France); Remorque porte-tracteur, a tractor-carrying trailer (Sté. R. Madurand et Cie., Chelles (S. et M.), France; Allman sprayer, designed and built for the Forestry Commission for spraying seedlings in nurseries (Allman Overseas Ltd., 7–8 Bury Court, St. Mary Axe, London, E.C.2); Hiab truck loader (Hydrauliska Industri Aktiebolaget, Hudiksvall, P.O. Box 117, Sweden).

11. SITE FACTORS: CLIMATE, SITUATION, SOIL, HYDROLOGY (WATER AND SOIL CONSERVATION)

See also No. 1419.

939. HAUFF, R., SCHLENKER, G., and KRAUSS, G. A. Zur Standortsgliederung im nördlichen Oberschwaben. **[Site classification in northern Upper Swabia.]** *Allg. Forst- u. Jagdztg.* 122 (1; 2), 1950 (3–12; 37–53 + 2 tbls.). 19 refs. [G.]

A comprehensive report on work since 1947, under the headings: growth regions; climate and its effects on the vegetation; postglacial forest development in the Federsee area; the original forest and forest history; forest vegetation communities and ground-vegetation types; site units (stable types, base-impoverished types, types with combined base deficiency and soil compaction); distribution of ground vegetation types; and silvicultural suggestions.

111. *The Atmosphere. Meteorology. Climate and Microclimate*

111.8. Climatology. Climate and Microclimate

See also Nos. 939, 954–6, 1036, 1088, 1092, 1219, 1431, 1823.

940. JENÍK, J. Vliv lesních cest na stanoviště. **[Influence of forest roads on the site.]** *Lesn. Práce* 31 (3), 1952 (110–20). [Cz.]

An illustrated ecological study along a 3-m.-wide road on a 30–35° slope of S. aspect near Berounsko in Bohemia, including a profile showing diurnal temperatures at levels near the ground. The road was found to exert a harmful influence on the site; the site class to a distance of 5–20 m. above the road was lower than that of the forest below it. Recommendations are made for special silvicultural treatment of road margins.

941. KLEMENT, O. Der ökologische Zeigerwert der Flechten in der Forstwirtschaft. **[The ecological indicator value of lichens in forestry.]** *Forstarchiv* 22 (9/10), 1951 (138–40). [G.]

Degenerate structureless leprarioid lichens, e.g. *Lepraria aeruginosa*, *Phlyctis argena*, *Lecanora pinastri*, indicate light deficiency and the need for thinning. Much-branched forms, e.g. *Usnea*, *Alectoria*, *Letharia*, *Ramalina*, *Evernia*, indicate high humidity. The *Lobarietum pulmonariae*, characterized by *Lobaria pulmonaria* with species such as *Parmelia cetrarioides*, *Menegazzia pertusa*, *Sticta fuliginosa* and *Nephroma* spp., is associated with an annual rainfall of over 1200 mm. Medium rainfall, 700–1200 mm., is indicated by the *Parmelietum acetabulae* (*P. acetabulum*, *P. scortea*, with e.g. *Xanthoria parietina*, *Candelaria concolor*, *Physcia* spp.) on deciduous trees only, the *Parmelietum caperatae* (*P. caperata*, *P. dubia*, with the same associates) on both conifers and deciduous trees, or the *Parmelietum furfuraceae* (*P. furfuracea*, with e.g. *P. saxatilis* f. *aizonii*, *P. physodes*, *Cetraria glauca*, *C. chlorophylla*) on the acid bark of conifers and Birch. Dry conditions are shown by the *Physcietum ascendentis* (*Physcia ascendens*, *P. tenella*, *P. stellaris*, *P. pulverulenta*), which is almost confined to deciduous trees at the edge of the forest, occurring on conifers only in calcareous districts where the bark collects calcareous dust. *Evernia prunastri* near the butt of trees is a good indicator of frost pockets. *Parmeliopsis ambigua* marks the level of regular snow-drifting on the windward side of trees and also indicates high humidity. Attention is also drawn to the well known *Cladonia* communities of impoverished, acid soils; to species such as *Collema pulposum* as indicators of basic soils; and to the special 'wind forms' of the bearded lichens, e.g. *Parmelia furfuracea* f. *scobicina*, *P. physodes* f. *papillosa*, *Evernia prunastri* f. *ventosa*, as indicators of constant wind action. [Cf. *For. Abstr.* 14 (No. 1059).]

114. *Soil. Soil Science*

114.1. Soil Physics

See Nos. 954, 1073, 1196.

114.2. Soil Chemistry

See Nos. 942–4, 973.

114.3. Soil Formation. The Soil Profile and its Development. Litter, Humus etc.

See also Nos. 953, 973, 1038, 1073, 1088, 1310.

942. RÜHL, A. Über den Kalkgehalt des Bausandsteines (sm_2) und seine forstliche Bedeutung. **[The lime content of the Bausandstein [a subdivision of the bunter sandstone] and its significance for forestry.]** *Allg. Forst- u. Jagdztg.* 123 (4), 1952 (106–9). 16 refs. [G.]

The Bausandstein of Reinhausen, near Göttingen, bears for the most part a more calciphilous vegetation than other bunter-sandstone areas. Beech is the dominant tree species. Raw-humus formation and podzolization are rare, even under conifers. This is accounted for by the occurrence of scattered calcareous concretionary material in the sandstone proper. Both soil and Beech-litter analyses indicate that the available CaO varies rather widely from place to place owing to the irregular distribution of the concretions and to topographical variations in leaching, plateaux and hill-tops showing low CaO contents. There is some evidence of better forest growth in the areas with higher CaO contents.

943. BLOOMFIELD, C. **Translocation of iron in podzol formation.** *Nature, Lond.* 170 (4326), 1952 (540). 3 refs. [Rothamsted Experimental Station, Harpenden, Herts.]

Laboratory experiments showed that water extracts of the undecomposed leaves and bark of *Agathis australis* and of needles of *Pinus sylvestris* are capable of causing rapid reduction of soluble ferric compounds to the extent of 4–5 mg. of iron/g. air-dry Scots Pine needles. Furthermore over a wide range of pH values (4–7), the extracts are capable of causing non-biological solution of relatively large amounts of hydrous ferric and

aluminium oxides. Further experiments show it to be probable that the whole of the dissolved ferric oxide is reduced to the ferrous state. Continuous aeration of the reaction mixture appears to have little or no effect on the solution and reduction of ferric oxide. These results show that the percolation of rainwater through undecomposed conifer litter provides all the necessary conditions for the leaching of sesquioxides from the surface layers of the soil, the translocation of the Fe probably taking place in the form of a ferrous organic complex.

944. Lunt, A. H. **Some notes on forest litter-soil relationships.** *J. For.* 50 (10), 1952 (748–50). [Connecticut Agricultural Experiment Station, New Haven.]

Samples of litter and top mineral soil from mor and mull humus types in mixed hardwood stands were collected in autumn 1947. The soil was put into pots and in each case covered by litter from the other type (with controls covered by their own litter). The pots were kept on the greenhouse floor in winter and occasionally watered; for the rest of the year they were left out of doors in a shady place and watering left to the elements. In February 1950 observations were made on the amount and condition of the humus covering, weights of earthworm casts, and some chemical and physical characters. The differences in physical and chemical characteristics between the A_1 of mulls and the B_1 of mors usually found in field sampling were maintained more or less in the pot cultures; the soils under mull litter became slightly less acid and had a somewhat higher content of available N, P, K and Mg than those under mor litter; and slightly more litter remained on the mull soils, but no differences associated with kind of soil could be detected in the degree of incorporation of litter into the mineral soil.

945. Gates, F. C. **Notes on the decay of certain leaves buried at different depths in sphagnum peat.** *Abstr.* in *Bull. ecol. Soc. Amer.* 32 (3), 1951 (60). A.P.B.

Leaves of a number of trees and shrubs were placed in wire cloth cages and buried at depths of 5, 10, 20 and 30 cm. in sphagnum areas in a *Picea mariana* bog. After 3 years surprisingly little decay was apparent. Of the conifers *Larix laricina*, and of the deciduous species *Betula papyrifera*, showed the most decay. *Kalmia polifolia* was the first of the Ericaceae to decay.

946. Production et composition chimique de la matière organique. **[Production and chemical composition of organic matter [in the soil].]** *Rapp. Inst. nat. Étude agron. Congo belge 1951* 1952 (84–8). [F.]

Regular collection and measurements were made of the dry weight and chemical composition of leaves, twigs and fruits returned to the soil under mixed forest, *Macrolobium* forest, *Brachystegia* forest, and *Musanga* forest fallow. From data accumulated over 7 months it is estimated that the quantity of organic matter returned to the soil in Yangambi in all types amounts to 10–15 metric tons/ha./per annum, or 5 times the figure for temperate forests. Figures are also given for: the production of organic matter in leaves, wood, litter and roots (at different levels) by forest fallow aged 2, 5, and 8 years; the N, P, S, Ca, Mg, and K in kg./ha. contained in the vegetation on 3 types of grass and 3 ages of forest fallow; the amount (in g./kg. original material) of N, P, S, Ca, Mg, K, and ash liberated by the decomposition of leaves of *Macrolobium dewevrei*, aerial parts of *Panicum maximum*, leaves of *Annonidium mannii*, leaves of *Musanga smithii*, mixed leaves of forest species, and leaves of *Scorodophloeus zenkeri*; and relative abundance of microflora in the above-mentioned litters after 4 weeks of incubation. Measurements were also made of the comparative leaching of NO_3-N and NH_4-N, applied as fertilizers in a Coffee plantation.

114.4. Soil Classification. Soil Types

See also Nos. 943, 1038, 1084, 1088.

947. Carte pédologique de France: Quart N.O. **[Soil map of France: north-western sheet.]** École nationale des Eaux et Forêts, Nancy. 1952. 1 sheet, scale 1 : 1,000,000.

948. Oudin, A., Aubert, G., and Duchaufour, P. Notice jointe à la carte des sols de France: (Quart N.O.). **[Notes on the soil map of France (north-western sheet).]** École nationale des Eaux et Forêts, Nancy. 1952. pp. 19 + plate. [F.]

Describes the classification used, and the various soil types occurring in the region.

949. **Provisional soil map of Southern Rhodesia.** Geological Survey Office, Salisbury. 1951. Scale 1 : 3,000,000.

950. Prescott, J. A., and Pendleton, R. L. **Laterite and lateritic soils.** *Tech. Commun. Bur. Soil Sci., Harpenden* No. 47, 1952. pp. 51 + 7 photos. 133 refs. Price 6*s*.

Contains sections on the field characteristics, geographical distribution, and nature and origin of laterite, and on lateritic soils.

114.5. Soil Fertility. Soil Toxicity. Soil Depletion and Exhaustion

See also Nos. 939, 941, 1109, 1186, 1191, 1419.

951. Hilf, H. H. Weiserpflanzen für den Forstkulturbetrieb: Folgerungen aus Düngungsversuchen mit schnellwachsenden Holzarten. **[Indicator plants for forest plantation practice: conclusions from fertilizer trials with quick growing tree species.]** *Forstarchiv* 22 (3/4), 1951 (43–50). 18 refs. [G.]

Gives examples, from German trials, of the sensitivity of hybrid Black Poplars and osier Willows to adverse soil conditions and especially of their rapid response to soil improvement (by liming, fertilizing, addition of humus), to illustrate the theme that fast growing tree species naturally adapted to rich alluvial soils can be employed as indicators which will give measurable results in a short time. They may be used to test (*a*) the suitability of soils for their own growth and for that of other relatively exacting species, and (*b*) the effects of composition and rates of application of fertilizers and other soil amendments, and of soil cultivation. In tests of races etc., individual strains may react to fine differences in site factors and so make possible a

closer appreciation of the soil and its treatment on the one hand, and on the other, the suitability of the individual strains for particular sites.

114.6. Soil Biology

See also Nos. 946, 1150, 1310.

952. Taber, W. A. **Fungi of two forest soils of Johnson County.** *Proc. Iowa Acad. Sci.* 58, 1951 (209–14). 9 refs. A.P.B.

In an attempt to find the reasons for the sparsity of undergrowth under *Robinia pseudoacacia* compared with that of an adjoining area under Elm, Oak, and Hickory, an investigation was made into the fungus populations of the two soils. A list of the fungi isolated is presented. The populations of the two soils were almost identical.

953. Dudich, E., Balogh, J., and Loksa, I. Produktionsbiologische Untersuchungen über die Arthropoden der Waldböden. [**Research on the role of arthropods in the breakdown of litter in forest soils.**] *Acta Biol., Budapest* 3 (3), 1952 (295–317). 28 refs. [G.g.russ.] O.R.S.

Describes different sampling methods, gives data for macro- and mesofauna present in samples from 23 Hungarian forests, and discusses their litter consumption and its effect on the soil.

116. *Hydrology. Soil and Water Conservation and Erosion*

See also Nos. 932, 1178–9, 1184–5, 1293, 1787, 1818–22.

954. Hale, C. E. **Further observations on soil freezing in the Pacific Northwest.** *Res. Note Pacif. Nthwest. For. Range Exp. Sta.* No. 74, 1951. pp. 8. 2 refs.

Study plots were established on open grassland and on brush types, in Ponderosa Pine and in Lodgepole Pine. Observations were made from November to April, and figures for snow depth and frost depth are shown in graphs. Results include the following: impermeable frost occurred on all the soil-cover complexes at one time or another; mixed Douglas Fir and Lodgepole Pine stands, found mainly on pumice soils on north slopes, had more frequent and longer impermeable frost than any other complex studied; impermeable frost was found least often on south slopes covered with open stands of Ponderosa Pine or grass; aspect and cover were of more influence than soil depth and drainage on frost occurrence; snow depth, which was related to aspect and cover, appeared to be an important factor in limiting occurrence and depth of impermeable frost; surface run-off over frozen ground was not noticeable, although standing water was found in depressions surrounded by impermeable frost; stalactite frost with soil heaving, most common in early winter and late spring and generally caused by night frost, was of a porous type, usually of short duration, and most commonly found on south slopes and shallow soils.

955. Mařan, B., and Lhota, O. Studie o výparu v lese a bezlesí. [**Investigations of evaporation in the forest and in the open.**] *Sborn. čsl. Akad. zeměd.* 25*B* (2), 1952 (61–82). 58 refs. [Cz.cz.russ.] C.G.B.

Presents the results of investigations made in 1949–51 in the mountain (very humid) and lowland (moderately humid) areas of Bohemia. Average precipitation and the average annual temperature are: for the highlands, 1267 mm. and 3·4° C.; for the lowlands, 616 mm. and 9·1°. It has been found that: (1) the total annual evaporation in very humid (peat soil) areas was as a rule less than the total rainfall, except in dry, warm years; (2) the evaporation in these areas exceeds the rainfall from late spring until early autumn; (3) dense Spruce stands intercepted on the average (for the 3 years 1949–51) 48·3% of the rainfall; (4) the evaporation under Spruce stands is much less than in the open; (5) the difference in evaporation between Spruce stands and open ground was greater in dry than in wet years; (6) microclimatic conditions were more favourable in *Pinus montana* stands than on a bare peat bog; (7) under a pure Pine stand the rainfall was less than in the open, but the amount intercepted by the crowns was only 14·5%; on the other hand, evaporimeter readings showed that evaporation under Pine was greater than the rainfall either in the forest or in the open.

956. Stone, E. L. Jr. **Evaporation in nature.** *J. For.* 50 (10), 1952 (746–7). 12 refs.

Reviews recent work on evaporation and transpiration from land surfaces, particularly that of Penman and Schofield at Rothamsted, and its repercussions on conventional theories.

957. Maruyama, I., and Inose, T. **Research on forest influence on stream-flow at Kamabuti. First report.** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 53, 1952 (1–46). 18 refs. [Jap.e.]

First results from two small catchments studied from 1939 and selected for their close similarity of topography and vegetation, with ca. 100 in. annual precipitation. The forest (mixed conifer and broad-leaved) was clear-felled from one catchment in 1947–8, its regrowth being cut back annually thereafter. Run-off in the first 3 years after cutting, as measured by stream gauges, was significantly increased from June to November but not from December to May (40% of the annual precipitation is snow). Peak run-offs increased by over 20%. Statistical analyses are presented.

958. Acosta-Solis, M. Por la conservación de las tierras andinas. La erosión en el Ecuador y métodos aconsejados para su control. [**Soil conservation in the Andes. Erosion in Ecuador and methods recommended for its control.**] Publicaciones Científicas M.A.S., Quito. 1952. pp. 187 + 1 map + 3 tbls. + 50 plates. 44 refs. [Span.e.f.g.] Price U.S. $4.00.

Reviews the situation in Ecuador and suggests methods for erosion control, with particular reference to Tungurahua province, for which an erosion control scheme is drawn up.

959. Kirwald, E. Forsttechnische Bachverbauung als Landespflege. [**Torrent training by forestry techniques as a method of soil conservation.**] *Forstwiss. Cbl.* 71 (7/8), 1952 (193–214). [G.g.]

Describes types of damage caused by unregulated stream-flow, and the principles, objects and methods of catchment management and torrent training, with some illustrated examples of control works.

960. MESSINES, J. **Methods of controlling mountain torrents used by the Administration des Eaux et Forêts in the Alps.** *Proc. UNSCCUR, Lake Success, 1949* 5, 1951 (155–61). 26 refs.

Describes with photographs, reafforestation and engineering techniques used during the last 10–20 years.

961. PAVARI, A. **Control of mountain torrents and avalanches through establishment and maintenance of forest cover.** *Proc. UNSCCUR, Lake Success, 1949*, 5, 1951 (168–70). 4 refs.

A general account of Italian methods.

962. HESS, E. **Torrents and avalanches.** *Proc. UNSCCUR, Lake Success, 1949*, 5, 1951 (151–5).

A brief account of Swiss experience in afforestation of catchment areas and areas subject to avalanche danger, and species suitable for these areas.

963. CHATURVEDI, M. D. **The Rajputana desert: a scheme for its immobilization.** *Indian For.* 78 (10), 1952 (486–9).

14. SYSTEMATIC ZOOLOGY

145.7. Insecta. Entomology

See also Nos. 970–2, 1338 *et seq.*, 1662 *et seq.*

964. BOSQ, J. M. Enumeración de predatores observados en la República Argentina (Coleópteros y Hemípteros). **[List of predators observed in Argentina (Coleoptera and Hemiptera).]** [*Publ.*] *Inst. Sanid. veg. Argent.* (*Ser. A*) 8 (54), 1952. pp. 29. [Span.span.]

An annotated list of insect predators of insect pests.

965. ROSS, D. A. **Key to the puparia of the dipterous parasites of *Choristoneura fumiferana* Clem.** *Repr.* from *Canad. Ent.* 84 (4), 1952 (108–12).

966. PŘÍHODA, A. Užitečnost mouchy *Thereva nobilitata* Fabr. v lesnictví. **[The usefulness of *T. nobilitata* in forestry.]** *Lesn. Práce* 31 (3), 1952 (129–32). [Cz.]

Laboratory and field observations conducted in 1950–1 have shown that this and other species of *Thereva* are definitely not pests of cereals, but that their larvae prey on other larvae (including those of their own species in some cases). Laboratory tests have confirmed that larvae of *T. nobilitata* prey on the larvae of *Cephaleia abietis*.

967. TINKER, M. E. **The seasonal behavior and ecology of the Boxelder bug *Leptocoris trivittatus* in Minnesota.** *Ecology* 33 (3), 1952 (407–14). 8 refs.

The study showed that the food most frequently taken by *L. trivittatus* was seed of *Acer negundo*. This explains why the bug is abundant only on pistillate trees, and also why there is a seasonal shift of bugs from the ground and low vegetation to the trees. Areas of aggregation were determined by food and temperature conditions. The temperature threshold for activity appeared to be ca. 20° C. The second generation was not complete by the end of the year, and it seems that bugs which do not mature in the autumn do not survive the winter.

968. SIPPELL, W. L. **Winter rearing of the forest tent caterpillar, *Malacosoma disstria* Hbn. [in the laboratory].** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 8 (4), 1952 (1–2).

969. BASILEWSKY, P. Les Bostrychides du Congo Belge (Coleoptera Cucujoidea). **[The Bostrichidae [incl. Lyctidae] of the Belgian Congo.]** *Rev. Zool. Bot. afr.* 46 (1/2), 1952 (81–150). 5 refs. [F.]

Notes on the species and their distribution.

15. ANIMAL ECOLOGY (INCLUDING GAME AND FISH MANAGEMENT, HUNTING, SHOOTING AND FISHING)

See also Nos. 1329 *et seq.*

970. SANKEY, J. H. P. **The winter macro-fauna of an old Pine stump on heathland.** *Ent. mon. Mag.* 88 (1061), 1952 (223–4). 6 refs.

Enumerates a number of species (both vertebrate and invertebrate) found on a decayed Pine log in Surrey.

971. HOWDEN, H. F. **Insect communities of standing dead Pine (*Pinus virginiana* Mill.).** *Annals of the Entomological Society of America, Columbus, Ohio* 44 (4), 1951 (581–95). 25 refs. O.R.S.

In 86 dead standing Pines, 184 insect species were found during weekly observations in 1948–9. Recently dead trees supported a larger number of species than those more than 2 years dead, presumably because of the greater nutritional value of freshly dead wood. In these, Scolytidae predominated, and in trees over 6 months dead, Buprestidae and Cerambycidae. Several years later termites were the most numerous, and still later they were partially replaced by saprovores. In trees dead up to 2 years, the largest number of species was found under the bark, decreasing to almost nil in the heartwood.

972. **[Symposium on population problems.]** *J. Ecol.* 40 (2), 1952 (425–8).

Summarizes papers on: population dynamics in insects (*G. C. Varley*); competition and the structure of the community [exemplified by *Pteridium* and *Calluna*] (*A. S. Watt*); population dynamics in birds (*D. Lack*); population dynamics in mammals (*D. H. Chitty*); and some others.

16. GENERAL BOTANY

160. *Plant Chemistry*

See also Nos. 946, 1131, 1514 *et seq.*, 1739 *et seq.*

973. FELFÖLDY, L. J. M. Erdei fák lombjának mésztartalmáról. **[The calcium content of the foliage of some forest trees.]** *Agrokémia és Talajtan, Budapest* 1 (1), 1951 (77–84). 16 refs. [Hu.russ.e.] [Biological Research Institute, Tihany, Lake Balaton.] H.S.B.

Investigation of the foliage of 27 deciduous tree and shrub species showed that the Ca content of their leaves expressed in % of dry matter increased with the age of the leaves. It is therefore important that

comparison of species should be made with leaves of the same age. If it is desired to know how much Ca is deposited in the soil by fallen leaves, only data derived from late autumn samples should be used. Of the species analysed, shrubs showed higher Ca content than trees, with the exception of *Prunus padus*, *Robinia pseudoacacia* and *Juglans regia* which headed the list. The Ca content of foliage and that of the soil were not directly correlated. Ca contents of species belonging to any one genus were of the same order of magnitude, e.g. *Prunus* spp. had a high, *Quercus* spp. a medium, and *Pinus* spp. a low Ca content.

974. IIZUKA, N. **On the ground [basic] substance of free [*sic*] bark.** *Journal of the Japanese Forestry Society, Meguro, Tokyo* 33, 1951 (7–10). From *abstr.* in *Rec. Res. Fac. Agric. Univ. Tokyo* No. 1, 1950/51 (1952), (78). [E.]

A preliminary report. The yields, sp. gr. and characteristics of tar and residual charcoal from dry distillation of outer bark differed from those of wood tar and charcoal, suggesting that the basic substance of the bark is not cellulose. The purified outer bark (extracted with alcohol/benzene (1 : 1) and with water below 120° C.) was converted into almost soluble matter by dilute alkali digestion, yielding large quantities of fatty acids, 42·82–52·16% of the original bark. Purified outer barks resisted oxidation. These facts indicate that their basic substance belongs to the suberin group.

975. MIGITA, N., KANDA, T., and HASHIMOTO, Y. **Chemical studies of cork substance. (1) Chemical composition of cork of *Quercus variabilis*.** *Journal of the Japanese Forestry Society, Meguro, Tokyo* 33, 1951 (102–5). From *abstr.* in *Rec. Res. Fac. Agric. Univ. Tokyo* No. 1, 1950/51 (1952), (84). [E.]

976. DAVID, R., and MASQUELIER, J. La localisation des composés catéchiques phlorogluciques dans les organes végétatifs du pin maritime. **[The localization of phloroglucic catechic compounds in the vegetative organs of *Pinus pinaster*.]** *C.R. Acad. Sci., Paris* 135 (21), 1952 (1325–7). 5 refs. [F.] O.R.S.

977. SOSA, A., and SOSA-BOURDOUIL, C. Études de quelques constituants chimiques de pollen de *Corylus avellana*. **[Some chemical constituents of the pollen of *C. avellana*.]** *C.R. Acad. Sci., Paris* 135 (17), 1952 (971–3). 1 ref. [F.f.] O.R.S.

978. PEYNAUD, E. Note sur le dosage de l'acide *d*-tartrique par la méthode au racémate à l'aide d'un extrait de *Bauhinia reticulata* D.C. **[The determination of *d*-tartaric acid by the racemate method using an extract of *B. reticulata*.]** *Bull. Soc. chim. Fr.* 18 (11/12), 1951 (911–2). 4 refs. [F.f.] O.R.S.

An aqueous extract of the leaves of *B. reticulata*, which are rich in *l*-tartaric acid, can be used instead of *l*-NH_4 tartrate. Comparative results using the aqueous extract and *l*-NH_4 tartrate on 2 red and 2 white wines are tabulated.

979. MARINI-BETTOLO, G. B., and FALCO, M. R. Ricerche sui pigmenti delle Mimosacee del Sud-America. Naringenina da una *Acacia longifolia* del Rio de la Plata. **[The pigments of South American Mimosaceae. Naringenin from an *Acacia longifolia* from the Rio de la Plata.]** *Annali di Chimica, Roma* 41 (4/5), 1951 (221–6). [It.it.] L.S.

Naringenin (5-7-4′-trioxy-flavanone) isolated from a tree of *A. longifolia* was the first recorded occurrence of this substance in a leguminous plant.

980. VARSHNEY, I. P., and FAROOQ, M. O. Étude de l'influence de la nouvelle saponine d'*Albizzia lebbek* Benth. sur la germination et la croissance des graines. **[Effect of the new saponin from *A. lebbek* on the germination and growth of corn.]** *Comptes Rendus des Séances de la Société de Biologie et de ses Filiales, Paris* 146 (11/12), 1952 (902–4). 5 refs. [F.] O.R.S.

Germination of corn was improved by soaking the grains in dilute solutions of a saponin from *A. lebbek*. Higher concentrations retarded germination.

981. ANSTEE, J. R., ARTHUR, H. R., BECKWITH, A. L., DOUGALL, D. K., JEFFERIES, P. R., MICHAEL, M., WATKINS, J. C., and WHITE, D. E. **The chemistry of Western Australian plants. Part VI. The occurrence of betulic, oleanolic, and ursolic acids.** *J. chem. Soc.* Oct., 1952 (4065–7). 1 ref. O.R.S.

Betulic acid has been obtained from 6 *Melaleuca* spp. 'Melaleucin' is probably betulic acid. *From authors' summary.*

982. GIRI, K. V., GOPALKRISHNAN, K. S., RADHAKRISHNAN, A. N., and VAIDYANATHAN, C. S. **Proline and hydroxyproline in leaves [of *Santalum album*].** *Nature, Lond.* 170 (4327), 1952 (579–80). 7 refs. [Indian Institute of Science, Bangalore.]

983. PATEL, C. S., and PATEL, C. B. **Chemical examination of the fruit of *Balanites roxburghii* (Planch.).** *Abstr.* in *Proc. 38th Indian Sci. Congr.* Part III, 1951 (70). C.G.B.

161. *Physiology*

See also Nos. 988, 1037, 1054–5, 1122, 1306, 1322, 1373, 1387, 1497–8.

984. TUKEY, H. B., TICKNOR, R. L., HINSVARK, O. N., and WITTWER, S. H. **Absorption of nutrients by stems and branches of woody plants.** *Science* 116 (3007), 1952 (167–8). 10 refs. O.R.S.

Experiments using radio-active isotopes showed that $CaCl_2$, *o*-phosphoric acid, K salts and urea applied to leaves and stems of Apple, Cherry and Peach trees were rapidly absorbed. Injury in the form of bud-killing and delayed bud start arose from concentrations greater than 8% of any of these substances.

985. SATOO, T. **Water intake by cuttings of Sugi [*Cryptomeria japonica*].** *Journal of the Japanese Forestry Society, Meguro, Tokyo* 32, 1950 (287–92). From *abstr.* in *Rec. Res. Fac. Agric. Univ. Tokyo* No. 1, 1950/51 (1952), (65–6). [E.]

Experiments showed that unrooted cuttings having callus on the cut surface transpired significantly more than those without callus. Uptake of water through gaps or wounds in the callus was demonstrated by coloured solutions.

986. KATO, R. **An attempt at the rational elucidation of plant life: hydrature and *Abies-Picea* climax in Japan. II. Seasonal change of**

osmotic pressure of the cell-sap of dominant trees in coniferous forests. *Journal of the Japanese Forestry Society, Meguro, Tokyo* 33, 1951 (215–8). From *abstr.* in *Rec. Res. Fac. Agric. Univ. Tokyo* No. 1, 1950/51 (1952), (62). [E.]

The osmotic pressure (o.p.) of cell sap of the leaves of *Abies sachalinensis, Picea jezoensis* and *P. glehnii* was measured periodically from August 1949 to August 1950. The seasonal change in o.p. seems to bear an important relationship to that of temperature, and air temperatures of 0 and 5° C. seem to have an important effect on the seasonal change of o.p. in coniferous trees. Judging from the seasonal curve, the form of seasonal change of o.p. in the 3 dominant species is divided into two types, the *Abies* type (*A. sachalinensis*) and the *Picea* type (*P. jezoensis* and *P. glehnii*). The former exhibited maximum o.p. (35 atm.) in January, while the latter kept a lower, fairly constant o.p. (28–30 atm.) from November to March. From known correlations between winter-hardiness and o.p. it is concluded that species of the *Picea* type are frost-hardier than those of the *Abies* type.

987. Rao, C. V. **The cause of sterility in some Sterculiaceae.** *Abstr.* in *Proc. 38th Indian Sci. Congr.* Part III, 1951 (150–7). C.G.B.

The causes of sterility in *Dombeya spectabilis, D. mastersii, Guazuma tomentosa* and *Sterculia colorata* were investigated and found to be genetic.

163. *Embryology*

988. Bulard, C. Culture aseptique d'embryons de *Ginkgo biloba:* rôle des cotylédons dans l'absorption du sucre et la croissance de la tige. **[Aseptic culture of embryos of *G. biloba*: the role of cotyledons in the absorption of sugar and the growth of the shoot.]** *C.R. Acad. Sci., Paris* 235 (14), 1952 (739–41). [F.f.] O.R.S.

Test-tube experiments showed that the medium must contain sugar. If the root only is in contact with the sugar, shoot growth is inhibited; if the cotyledons are in contact with sugar, growth is normal unless the culture is made in darkness, when both root and cotyledons must be in contact with the sugar.

989. Illies, Z. M. Auslese von Mehrlingskeimlingen in Einzelbaumnachkommenschaften von *Picea abies.* **[Selection of seedlings growing from polyembryonic seed in the progeny of a single tree of *P. abies*.]** *Abstr.* in *Z. Forstgenet.* 2 (1), 1952 (21). [G.]

Among 231 seedlings, the progeny of a single tree, there occurred 74 which had obviously developed from polyembryonic seed. Six morphological types were distinguishable. The results of a cytological study of these plants are presented and the origin of such plants is discussed.

164. *Morphology*

See also Nos. 1016, 1050, 1054.

990. Datta, A., and Datta, D. **Microscopical studies on the leaves of *Eucalyptus globulus* Labill. and three other species grown in India.** *J. sci. industr. Res., India* 11*B* (5), 1952 (181–5). 7 refs. D.S.I.R.

Describes morphological and histological characters of young and mature leaves of *E. globulus, E. rostrata, E. viminalis* and *E. polyanthemos.*

165. *Phylogeny, Evolution. Heredity, Genetics, and Breeding, Variation*

See also Nos. 987, 989, 1011, 1016–7, 1025, 1027, 1046, 1050, 1120–2, 1128, 1133 *et seq.*, 1688, 1855.

991. Houtzagers, G. **Forest genetics and Poplar breeding in the Netherlands. I. The difference between breeding work in forestry and agriculture or horticulture. II. Poplar breeding in the Netherlands.** *Euphytica* 1 (1; 3), 1952 (10–4; 161–74). 7 + 10 refs. [E.du.] O.R.E.

992. Wettstein, W. von. Prüfungen an Nachkommenschaften guter Harzbäume. **[Tests of the progeny of good resin yielders.]** *Abstr.* in *Z. Forstgenet.* 2 (1), 1952 (22). [G.]

Resin yield in *Pinus nigra* was found to depend on the development of the epithelial cells and upon secretion pressure. These characteristics can be used to select good resin yielders from among seedlings 1–3 years old.

993. Lehmann, E. Zur Frage der Resistenzzüchtung der Weymouthskiefer gegen Blasenrost. **[The problem of breeding *Pinus strobus* for resistance to blister rust.]** *Allg. Forst- u. Jagdztg.* 122 (6/7), 1951 (206–13). 68 refs. [G.]

A review, chiefly of American work on the existence of resistant strains and their propagation (mainly vegetative) and testing.

994. Marquardt, H. Genetische Grundlagen der *Adelopus*-Resistenz von *Pseudotsuga Douglasii* und mögliche Verfahren zur Gewinnung resistenteren Pflanzenmaterials. **[Genetical bases of resistance to Swiss needle-cast disease in Douglas Fir, and possible means of obtaining more resistant planting stock.]** *Allg. Forst- u. Jagdztg.* 122 (6/7), 1951 (201–5). 2 refs. [G.]

Discusses in general terms the genetical basis of disease resistance as illustrated by research on cotton, finding some hope, on theoretical grounds, that major genes governing resistance to *Phaeocryptopus gäumanni* may be discovered among American Douglas Fir populations and used for selection. Any fresh introductions of American strains of this species should be deliberately exposed to infection, to weed out obviously susceptible individuals. Points out the existence in diseased German stands of apparently resistant trees and urges the need for attempting selection among their progeny under conditions such that cross-pollination with susceptible parents can be eliminated, stressing the possibilities of vegetative propagation and the establishment of seed orchards. [Cf. *For. Abstr.* 14 (Nos. 1324–5).]

995. Grehn, J. Das Samengewicht bei Kreuzungen innerhalb der Sektion *Populus Leuce* als Funktion des weiblichen und männlichen Partners. **[Seed weight in crosses within *Populus* section *Leuce* as a function of the male and female parents.]** *Z. Forstgenet.* 2 (1), 1952 (8–16). Numerous refs. [G.g.e.]

Investigations of seeds from *Populus* crosses within the section *Leuce* show definite differences in weight, which can be traced back to the influence of both the ♂ and the ♀ parents. The systematic tendency of this influence is clearly demonstrated by graphs, and the correlation is discussed with reference to: the evolution of the species, the occurrence of heterosis, differences between reciprocal crossings, and possible early recognition of promising hybrids.

996. ROHMEDER, M., and DIMPFLMEIER, R. *Larix decidua* Mill. × *Larix gmelini* Pilg., ein in Grafrath mehrfach natürlich entstandener luxurierender Bastard. [***L. decidua* × *L. gmelini*, a vigorous hybrid occurring spontaneously and repeatedly at Grafrath.**] *Z. Forstgenet.* 2 (1), 1952 (16–9). 7 refs. [G.g.e.] [Institut für Forstsamenkunde und Pflanzenzüchtung, München.]

In the experimental plots at Grafrath, where exotics are being tried out, a number of Larch hybrids have appeared, the result of natural crosses between *L. decidua* and *L. gmelini*. The largest of these is 17 years old and has the following measurements: height 14·8 m.; d.b.h., 28 cm.; volume of timber over 7 cm. in diam., 0·36 cu.m.; form factor, 0·537; crown area, 161 sq. m.; and crown volume, 192 cu.m. The hybrids are so vigorous and promising that artificial crosses are being made. The name *L. eurokurilensis* is proposed for this new species hybrid.

166. *Economic Botany*
See Nos. 1739 *et seq.*

168. *Histology*
See Nos. 1491 *et seq.*

17. SYSTEMATIC BOTANY

172.8. Eumycetes (True Fungi)

See also Nos. 952, 1307 *et seq.*, 1650 *et seq.*

997. BRETZ, T. W. **The ascigerous stage of the Oak wilt fungus.** *Phytopathology* 42 (8), 1952 (435–7). 8 refs.

The perithecial stage of *Chalara quercina* is described, and is named by the author *Endoconidiophora fagacearum*. [Cf. *For. Abstr.* 14 (Nos. 1318–9).]

998. HEPTING, G. H., TOOLE, E. R., and BOYCE, J. S., JR. **Sexuality in the Oak wilt fungus.** *Phytopathology* 42 (8), 1952 (438–42). 15 refs.

Cf. *For. Abstr.* 14 (No. 70).

172.9. Lichens

See Nos. 941, 1059.

174. *Spermatophyta, Seed-Plants in General. Floras and Check-Lists*

See also Nos. 1032, 1072.

999. GRUBOV, V. I., and JUNATOV, A. A. Osnovnye osobennosti flory Mongoljskoĭ Narodnoĭ Respubliki v svjazi s ee raĭonirovaniem. **[Principal peculiarities of the flora of the Mongolian People's Republic in connexion with its division into floristic regions.]** *Bot. Ž.* 37 (1), 1952 (45–64). 22 refs. [Russ.] C.G.B.

According to the data of the Moscow Botanical Institute, the flora of Mongolia comprises some 1550 species in 88 families, of which *Gramineae* and *Compositae* are responsible for over 10% each. The flora of the northern part of the country (belonging to the holoarctic region) is richer and more heterogeneous than that of the southern part (the ancient 'Mediterranean' region). Six sketch maps show the distribution of *Stipa* (series *Capillatae* and *Barbatae*), *Haloxylon ammodendron*, *Salsola passerina*, *Nanophyton erinaceum*, and *Larix sibirica*, while another map shows the division of the country into 16 floristic regions.

1000. KURUTA, S., and FUNABIKI, K. **The forest flora of Niigata prefecture [Japan] and its silvicultural consideration.** *Bulletin, Niigata College of Agriculture and Forestry* 1951 (132–9). From *abstr.* in *Rec. Res. Fac. Agric. Univ. Tokyo* No. 1, 1950/51 (1952), (62). [E.]

1001. KUSAKA, M. **New or noteworthy trees and shrubs of Japan (1).** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 53, 1952 (47–57). [Jap.e.]

Abies firma var. nov. *iidaensis*, *A. firma* f. nov. *ohsumiensis*, and *A. sikokiana* f. nov. *virida*, are described. *A. sachalinensis*, *A. mayriana* and *A. wilsonii* are considered to be one species and the names *A. sachalinensis* vars. *typica*, *mayriana* and *wilsonii* respectively are recommended. *A. firma* var. *dimidio-depressa* is considered to be an abnormal form of typical *A. firma*.

1002. ANDREWS, F. W. **The flowering plants of the Anglo-Egyptian Sudan. Vol. II (Sterculiaceae-Dipsacaceae).** T. Buncle & Co. Ltd., Arbroath, Scotland, for the Sudan Government. 1952. pp. viii + 485. Price 22*s.* 6*d.* [Cf. *For. Abstr.* 12 (No. 1791).]

1003. EGGELING, W. J. [Revised and enlarged by DALE, I. R.] **The indigenous trees of the Uganda Protectorate.** Government Printer, Entebbe, Uganda, and Crown Agents for the Colonies, 4 Millbank, London, S.W.1. 1952. pp. 491 + 20 coloured plates + 55 photos + 1 map. Price 42*s.*

First ed. published 1940 [cf. *For. Abstr.* 2 (p. 258)]. The new edition is much enlarged and has many new illustrations.

1004. PHILLIPS, E. P. **The genera of South African flowering plants.** *Mem. bot. Surv. S. Afr.* No. 25, 2nd ed., 1951. pp. 923. Numerous refs.

1005. CODD, L. E. W. **Trees and shrubs of the Kruger National Park.** *Mem. bot. Surv. S. Afr.* No. 26, 1951. pp. 122 + 6 coloured plates. Price 7*s.* 6*d.*

1006. MILLER, O. B. **The woody plants of the Bechuanaland Protectorate.** *Repr.* from *Journal of South African Botany, Cape Town* 18, 1952 (1–100 + 1 map).

An enlarged check-list. [Cf. *For. Abstr.* 10 (No. 87).]

1007. PARDY, A. A. **Notes on indigenous trees and shrubs of Southern Rhodesia.** *Rhod. agric. J.* 49 (3; 4), 1952 (171 . . . 175 + 10 plates; 216 . . . 220 + 9 plates). E.M.B.

Burkea africana, *Guibourtia coleosperma*, *Kirkia acuminata*, *Schotia brachypetala*, *Acacia macrothyrsa*, *Cussonia natalensis*, *Lonchocarpus capassa*, *Diplorrhynchus mossambicensis*, *Peltophorum africanum*, *Piliostigma thonningii*, *Cassia abbreviata*, and *Pterocarpus rotundifolius*. [Cf. *For. Abstr.* 14 (No. 114).]

1008. STANDLEY, P. C., and STEYERMARK, J. A. **Flora of Guatemala. III.** *Fieldiana* (*Bot.*) 24 (3), 1952. pp. 432.

Cf. *For. Abstr.* 12 (No. 148).

1009. COWAN, R. S., *et al.* **Plant explorations of G. Wilson-Browne, S. J., in British Guiana. 1. Kanuku Mountains.** *Brittonia*, *N.Y.* 7 (5), 1952 (389–414).

Includes descriptions of some new tree species and varieties.

1010. HILDEBRAND, F. H. Verbeterde boomnamenlijst van Bangka en Billiton. [**Revised list of tree species of the Banka and Billiton Islands.**] *Rapp. Bosbouwproefsta., Bogor* No. 57, 1952. pp. 48. [Jav.Du.E.]

The list is in two parts arranged (1) by vernacular names and (2) under family, genus and species. Each gives the scientific name, the vernacular name, its language or dialect, and the durability class of the wood. [Cf. *For. Abstr.* 14 (No. 119).]

174.2. Gymnosperms

See also No. 996.

1011. FLORIN, R. Évolution et classification des Gymnospermes. [**The evolution and classification of the Gymnosperms.**] *Année biologique*, *Paris* 28 (5/6), 1952 (99–108). 18 refs. [F.] O.R.S.

1012. NEGER, F. W., and MÜNCH, E. [Revised by HUBER, B.] Die Nadelhölzer (Koniferen) und übrigen Gymnospermen. [**The Coniferae and other gymnosperms.**] Walter de Gruyter & Co., Berlin. 4th ed. (rev.) 1952. pp. 140. 14 refs. [G.]

A pocket handbook containing (*a*) a brief introductory section with notes on reproductive biology, economic importance, and variation within species; and (*b*) descriptions of species, in systematic order, with keys to genera. An appendix gives, for important species only, keys to the woods (microscopic and macroscopic), seeds, and seedlings.

An index is provided to scientific and common names.

1013. HOLTEN, J. Lærken. [**Larch.**] *Svensk SkogsvFören. Tidskr.* 50 (3), 1952 (263–74). [Sw.]

A general account of species, distribution, hybrids, and cultivation, with particular reference to Scandinavia.

1014. GORDON, A. G. **Spruce identification by twig characteristics.** *For. Chron.* 28 (3), 1952 (43–5).

Proposes the use of twig surfaces as a method of distinguishing *Picea mariana*, *P. rubens* and *P. glauca*.

176.1. Dicotyledons

1015. LI, H.-L. **The genus *Acer* (Maples) in Formosa and the Liukiu (Ryukyu) Islands.** *Pacif. Sci.* 6 (4), 1952 (288–94). 16 refs. E.M.B.

Describes the species of this region, with a key.

1016. DESMARAIS, Y. **Dynamics of leaf variation in the Sugar Maples.** *Brittonia*, *N.Y.* 7 (5), 1952 (347–87). 56 refs.

Leaf characteristics (mainly types of outline) were examined and made the basis of a taxonomic study of the *Acer saccharum* group in eastern N. America. The following taxa were distinguished: four principal types—*floridanum*, *saccharum*, *nigrum*, and *grandidentatum*; and two intermediates—*schneckii* and *leucoderme*. These taxa have been recognized as subspecies rather than varieties. They have definite geographical patterns, and can be divided within these areas into smaller groups, which may be called varieties. The divisions, their characteristics, and variability, origin, distribution and systematics, are discussed and a key based on leaf characters is presented. The subspecies are not of equal rank and do not have the same relationships, *saccharum* and *nigrum* are two populations united by a large intermediate population representing a variety of recombinations of the characters of the subspecies.

A similar cline, *floridanum—grandidentatum*, unites these two well defined subspecies. *Leucoderme* and *schneckii* are two homogeneous populations intermediate between *nigrum* and *floridanum* and *saccharum*, *floridanum* and *grandidentatum* respectively.

1017. FROILAND, S. G. **The biological status of *Betula andrewsii* A. Nels.** *Evolution* 6 (3), 1952 (268–81). 12 refs. O.R.S.

An analysis of morphological and phenological characters of a colony of *B. andrewsii* near Boulder, Colorado, supports the hypothesis that this name covers a hybrid swarm involving *B. occidentalis* and *B. papyrifera*.

1018. VASILJEV, I. V. Obzor berez Kavkaza. [**A review of the Caucasian Birches.**] *Bot. Ž.* 36 (6), 1951 (607–21). 21 refs. [Russ.] C.G.B.

Results of investigations made in the Botanical Institute of the USSR Academy of Sciences. Representatives of both subgenera, *Costatae* and *Albae*, of the genus *Betula* are found in the Caucasus. The author affirms that *B. raddeana* belongs to the *Costatae*, viz. to the branch *Chinenses* (not *Atlanticae*) of the section *Ermani* of this subgenus. The only other species of the same subgenus is *B. medwedewi*. Of the *Albae*, the Caucasus has species in both of the groups *Verrucosae* and *Pubescentes*. The former includes *B. pendula* [*B. verrucosa*] (rare) and *B. microlepis*. *B. alba* [*B. pubescens*] and *B. litwinowi* represent the latter group together with *B. tortuosa*. Three varieties of *B. litwinowi*—vars. *svanica*, *abchasica*, and *recurvata* var. nov., occur in the region. In the subgenus *Costatae*, *B. medwedewi* appears to be more primitive than *B. raddeana*; *Pubescentes* are more primitive than *Verrucosae*. The origin and history of the Birches of the Caucasus are outlined.

1019. CHAVANCY, A. L'abrasin en Indochine. [***Aleurites montana* in Indo-China.**] *Agron. trop.* 7 (5), 1952 (455–86). [F.]

A botanical study.

1020. SMITH, A. C. **Studies of Pacific Island plants, XIII. Notes on Fijian Euphorbiaceae.** *J. Arnold Arbor.* 33 (4), 1952 (367–402).

Describes some new or unusual spp., and a number of both new and known spp. of *Antidesma*, *Macaranga* and *Acalypha*.

1021. CHEVALIER, A. Rectifications et additions à notre note d'Avril 1952: travaux français sur les *Eucalyptus*. [**Corrections and additions to the note of April 1952: French studies on the genus *Eucalyptus*.**] *Rev. int. Bot. appl. Agric. trop.* 32 (357/358), 1952 (356–7). [F.] P.R.

Cf. *For. Abstr.* 14 (No. 142).

1022. GARDNER, C. A. **Trees of Western Australia. 5. Salmon Gum (*Eucalyptus salmonophloia* F. Muell.). 6. Scarlet Pear Gum (*Eucalyptus stoatei* C. A. Gardn.).** *Leafl. Dep. Agric. W. Aust.* No. 2007, 1952. pp. 7. (*Repr.* from *Journal of Agriculture of Western Australia* Vol. 1 (3rd ser.) July-August 1952.)

Botanical descriptions.

1023. MARTÍNEZ, M. Los encinos de México y Centroamérica. [**The Oaks of Mexico and Central America.**] *An. Inst. Biol. Univ. Méx.* 22 (2), 1951 (351–68). C.G.B. [Span.]

A preliminary contribution to a study of *Quercus* in Mexico, including botanical history, a brief description of the genus, uses, taxonomy, and descriptions of *Q. emoryi* and *Q. urbani*.

1024. SANDWITH, N. Y. **Contributions to the flora of Tropical America. LV. Discovery of *Anisophyllea* in America.** *Kew Bull.* No. 3, 1952 (303–6). 13 refs.

A species of *Anisophyllea*, a genus hitherto only known in the Old World, was found in British Guiana, growing in *Eschweilera*/*Dicymbe* forest near the Polaro River. The new species is named by the author *A. guianensis*.

1025. MCVAUGH, R. **Suggested phylogeny of *Prunus serotina* and other wide-ranging phylads in North America.** *Brittonia, N.Y.* 7 (5), 1952 (317–46).

1026. PEACE, T. R. **Poplars.** *Bull. For. Comm., Lond.* No. 19, 1952. pp. 50 + 48 photos + 1 dgm. Price 7*s.* 6*d.*

This bulletin has been entirely re-written and supersedes an earlier one (1923) with the same title. It contains the following chapters: (1) Botanical description and choice of variety; (2) silviculture; (3) diseases and pests; (4) properties and uses of Poplar timber. There is a key to the chief varieties grown in Great Britain.

1027. ŠPALEK, V. Systematika a šlechtění topolů. [**Systematics and breeding of Poplars.**] *Čsl. Les* 31 (21), 1951 (466–70). [Cz.]

The Turanga Poplars have not been used by Czechoslovak Poplar growers. The main species of the section *Leuce* in Czechoslovakia are *P. alba*, *P. tremula* and their hybrid. This hybrid gives tall and straight stems in the first generation, but is apt to degenerate later. The only native species of Black Poplar in Czechoslovakia is *P. nigra*, of which there are 4 forms; *P. nigra* var. *italica* was imported from Asia Minor long ago; *P. deltoides* vars. *monilifera* and *missouriensis* are exotics of recent introduction. The 'Canadian' or 'Euro-American' Poplars are represented by: *P. serotina*, *P. marilandica*, *P. regenerata*, *P. gelrica*, *P. eugenei* and *P. robusta*; *P. robusta* is grown particularly in Slovakia. Possibilities of breeding are discussed.

1028. PODHORSKI, I. Uzgoj topola. [**Poplar growing.**] [*Publ.*] *Inst. šum. Istraž., Zagreb* No. 6, 1951. 39 refs. [Croat.]. Price *Din.*100.

Includes sections on: important species, varieties, and hybrids; ecological, biological, and silvicultural properties of the principal Poplars; silviculture; main pests and diseases; and technological properties and uses. The 39 references on which the work is based are all European, nearly half Jugoslav. The following data are of domestic origin: (1) The recommended length for cuttings in Jugoslavia is 18–25 cm. with 5–7 (not fewer than 4) buds, the shorter being used in good soil, the longer in poorer soil; the best thickness is 8–10 mm. The bundles of cuttings are stored if necessary, in clean river sand, in a vertical position, with buds pointing downwards. (2) Planting holes in the field should be ca. 50 × 50 × 50 cm. in loose soil. (3) Optimum spacing for Jugoslav conditions is 5 × 5 m. square, i.e. 400 stems/ha. (4) The 'Canadian' Poplars (*Populus serotina*) in the mixed stands of the Baranje forests were 40–80 cm. d.b.h. in 40–50 years. They contain ca. 70% structural timber and 30% firewood. The wood is of good quality. (5) Pure stands of *Populus robusta* at Darda (Baranje district) show at 11 years a high diameter increment and a density of 1100 stems/ha.

18. PLANT ECOLOGY

181. *Mode of Life, Autecology. Silvicultural Characters of Trees*

See also No. 1134.

1029. KYAW ZAN, U. **Choice of species in the Thitcho plains reserve of the Zigon forest division [, Burma].** *Burmese For.* 2 (1), 1952 (20–5). [E.]

Extensive sowing of *Acacia catechu* is recommended; it is easily raised, grows fast, can withstand competition from *Imperata*, is fire-resistant, produces firewood from thinnings at 5 years, is a good nurse to other species, and coppices well.

1030. KHAN, M. S. ***Anona squamosa*, Linn.** *Indian For.* 78 (9), 1952 (468–70). 4 refs.

Briefly indicates the silvicultural characters of the Custard Apple and suggests its use for afforestation of eroded soils.

1031. JAMES, N. D. G. **The case for Lime and Cherry.** *J. Land Agents' Soc.* 51 (10), 1952 (467–9).

Discusses the silvicultural characters of *Tilia cordata*, *T. platyphyllos* and *Prunus avium*, and their suitability as forest species in Britain.

181.1. Distribution, Natural Range

See also Nos. 1074, 1077.

1032. SOÓ, R. DE. État actuel des recherches géobotaniques et floristiques en Hongrie. [**Present state of geobotanical and floristic research in Hungary.**] *Vegetatio* 4 (1), 1952 (40–52). Numerous refs. [F.] A.P.B.

An account of research from the end of the 19th century until the present day.

1033. Breunlin, R. Die Weisstanne an der Grenze ihres natürlichen Verbreitungsgebietes im Kreise Leonberg. **[Silver Fir at the boundary of its natural range in the Leonberg District.]** *Allg. Forst- u. Jagdztg.* 123 (4), 1952 (112–7). 30 refs. [G.g.]

Examines the past and present distribution of the species in this part of Württemberg with special reference to the reasons for its retrogression since ca. 1900. Probably it first arrived during the post-glacial period and extended as clumps or small stands among the deciduous forest. Its further spread, especially after the cessation of forest grazing, appears to have been chiefly into forests managed as coppice with standards and selectively worked forests. During the 19th century it was widely planted and sown as pure stands under the clear-felling system, and this, combined with droughts and subsequent insect attack, seems to be the reason for retrogression. As a pronounced shade-bearer in youth, it has suffered from the alteration in forest climate caused by pure stands and clear felling, the effects of which on regeneration must be particularly felt at the extremity of its natural range. Examination of the site types on which it occurs, shows that it is outside its optimum—the *Abieto-fagetum*, but that it will do well in the Beech/Oak/Hornbeam forest ('fern-rich' type) in mixture with deciduous species, on open-textured, well aerated, moist soils with as much depth as possible.

1034. Hueck, K. Verbreitung und Standortsansprüche der brasilianischen Araukarie (*Araucaria angustifolia*). **[Range and site requirements of *A. angustifolia*.]** *Forstwiss. Cbl.* 71 (9/10), 1952 (272–89). Numerous refs. [G.]

1035. Cook, D. B., Smith, R. H., and Stone, E. L. **The natural distribution of Red Pine [*Pinus resinosa*] in New York.** *Ecology* 33 (4), 1952 (500–12). 39 refs.

181.2. Atmospheric Relations. Acclimatization

See also Nos. 986, 1051–2, 1112, 1122 *et seq.*

1036. Hejtmánek, J. Klimatické možnosti rozšíření duglasky zelené u nas. **[Climatic possibilities of extending the cultivation of *Pseudotsuga taxifolia* var. *viridis* in Czechoslovakia.]** *Lesn. Práce* 31 (3), 1952 (100–7). [Cz.cz.]

Douglas Fir being a typical maritime-climate species, the transition-type climate of Czechoslovakia is not best suited to it. The limiting climatic factor at the upper limit is the low winter temperature (average January temperature −3° C., absolute minimum −26 to −30° C.); the lower limit is set by insufficient rainfall (600 mm.) and high summer temperature (July average 17° C., absolute maximum 35–40° C.). Douglas Fir can be grown in Czechoslovakia only in a few restricted regions, particularly in foothill sites of western Bohemia at 400–750 m. altitude. Farther east, the upper limit is lowered and the lower limit rises, owing to the more pronounced continental climate. The present distribution of Douglas Fir in Czechoslovakia agrees fairly well with these growth regions.

181.3. Water, Soil and Root Relations (including Bacterial and Mycorrhizal Symbiosis)

See also Nos. 943, 1036, 1085, 1122, 1128, 1131, 1373.

1037. Rörig. Spurenelemente: über die Wirkung von Bio-Katalysatoren auf das Wachstum von Laub- und Nadelhölzern. **[Trace elements: the effect of bio-catalysts on the growth of broadleaved. trees and conifers.]** *Forstarchiv* 22 (3/4), 1951 (40–3) [G.g.]

A paper from the Institute of Soil Science, Eberswalde School of Forestry, prepared for publication in 1944 but recovered and now published only in part, describing small-scale experiments with Oak, Beech, Pine, Spruce, Poplar, and Eucalyptus in water culture to which Hoagland's solution or various combinations of trace-element solutions were added. All plants in pure nutrient solution without trace elements perished: after 3 winters the only healthy survivors were those given Hoagland's solution. Of plants given unbalanced solutions of trace elements, those supplied with B and Mn survived longer than others. All plants given Hoagland's solution throve. In Poplar 2- to 3-fold increases of leaf area were obtained by adding B to the nutrient solution: in Eucalyptus the leaf areas of controls and of plants given B and B + Mn + Cu were as 1 : 8 : 10. Some preliminary field trials are mentioned in which seedlings on poor and rich nursery soils were watered with trace-element solutions; as might be expected, those on the former showed no effect, and those on the latter, only a small one.

1038. Dimbleby, G. W. **Soil regeneration on the north-east Yorkshire moors.** *J. Ecol.* 40 (2), 1952 (331–41). 12 refs.

[Cf. *For. Abstr.* 12 (No. 2636).] The soils under a selection of stands of Birch of different ages, regenerated naturally on moorland in north-east Yorkshire, have been studied. The moorland soil is a podzol with a thin but tough iron-pan. As the Birch stands develop, the old heather raw humus becomes activated and eventually destroyed, and when this occurs a mull horizon develops in the mineral soil and the pan becomes partly disintegrated. There is a gradual increase of pH, particularly at the surface, as the age of the stand increases. Striking changes in soil fauna are recorded, species characteristic of deciduous woodland appearing surprisingly soon after colonization by Birch. It is estimated that it takes 60 to 100 years for the raw humus to be converted to mull.

Comparison is made with a 100-year-old Pine plantation, also developed from moorland, and here the podzol was virtually unchanged and the old *Calluna* raw humus still recognizable. Conditions were still as acid as the surrounding moorland, and none of the woodland fauna was detectable.

Though the changes under Birch take place with no cultivation or manuring, liming will also bring

out mull development, and two profiles are described where this has happened under different circumstances. *Author's summary.*

1039. Stojanov, G. A. Svoeobraznye razrastanija korneĭ sosny pri naličii ortzandovyh prosloek v počve. **[Peculiar growth of Pine roots when iron-pan is present in the soil.]** *Bot. Ž.* 36 (6), 1951 (649–50). 2 refs. [Russ.] C.G.B.

When investigating young Pine stands of natural origin in northern Ukraine on the left bank of the Dnieper, the author found abnormal growth of roots where an iron-pan was present. As it approaches the pan, the root acquires a greater plasticity, as if trying to utilize fully the available nutrients. It recurves repeatedly, branches off, and spreads on the surface of the pan, penetrating it to a small depth only where it is less compact. On the other hand, in artificially regenerated Pine stands, peculiar formations are sometimes observed, viz. small tubercles or cones suspended from the root and penetrating into the dense iron-pan. These tubercles are composed of thin rootlets, spirally wound and forming a cluster.

1040. Sirén, G., and Bergman, F. Svamparna och våra skogsträd. [**[Mycorrhizal] fungi and our forest trees.**] *Skogsbruket, Helsingfors* 21 (2), 1951 (39–43). 5 refs. [Sw.]

Results of measurements made on lengths of roots of different diameters in different soil layers from a 112-year-old Aspen/Spruce stand are tabulated. The total wood volume was calculated at 440 cu.m./ha. for the Aspen and 110 cu.m./ha for Spruce. Soil-block samples gave a total root length for all root diameters and all soil depths to 50 cm., of 12,456 m./sq. m. for Aspen and 498 m./sq. m. for Spruce. Mycorrhizae decreased steadily with increasing depth below ground level, but were found to a depth of 125 cm. Where Aspen roots were found growing through decayed Birch roots of an earlier forest, the Aspen roots were closer morphologically to roots of the humus than of the mineral soil layers. A few of the results of laboratory inoculations of Spruce and Aspen roots with fungi present in the soil are discussed. It was found possible to inoculate both Aspen and Spruce roots with cultures of *Gyromitra esculenta*, and mycelia with the characteristics of *G. esculenta* were isolated from mycorrhizae of Aspen; it had hitherto been considered that the ascomycetes, of which *G. esculenta* is an example, were unable to form mycorrhizae with tree roots.

1041. Jacobs, M. R. **The growth and regeneration of Eucalypts.** *Journal of the Australian Institute of Agricultural Science, Melbourne* 17 (4), 1951 (174–83). 5 refs. L.S.

Eucalypts can form leafy shoots in four ways: (1) through branches arising from naked buds; (2) from accessory buds; (3) through proventitious buds; and (4) from lignotubers or root swellings, which store reserve materials and have the power to form leaf buds if the upper part of the seedling is destroyed. More rapid growth overseas than in Australia is probably due to the absence of leaf-eating insects. In many parts of Australia Eucalypt seedlings remain for some time in an apparently suppressed condition, while their roots are obtaining a grip on the soil. This is made possible by the activity of the lignotubers. The nature of Eucalypt regeneration in forest and pasture land is described and discussed.

181.4. Reaction to Biotic Influences (Competition etc.) and Fire

See Nos. 972, 1053, 1108–9, 1192–3, 1299.

181.5. Reproductive Behaviour

See also Nos. 1012, 1041, 1104 *et seq.*

1042. Godnev, E. D. Schopnost borovice obecné obnovovat osu. **[The ability of *Pinus sylvestris* to regenerate its axis.]** *Lesn. Práce* 31 (3), 1952 (120–2). [Cz.]

Cf. *For. Abstr.* 13 (No. 2832).

1043. Kermode, C. W. D. **The flowering of Kyathaungwa (*Bambusa polymorpha*).** *Burmese For.* 2 (1), 1952 (9–14 + 1 photo). [E.]

Further notes on regeneration of Teak after gregarious flowering of *B. polymorpha.* [Cf. *For. Abstr.* 13 (No. 3685).]

1044. Gupta, M. **Gregarious flowering of *Dendrocalamus strictus*.** *Indian For.* 78 (11), 1952 (547–50). 8 refs.

Recent gregarious flowering of this Bamboo in the Lansdowne Division (U.P.), confirms the view that the life cycle of this species is 40 years.

1045. Andreánszky, G. La pollinisation par le vent et la pollinisation par les insectes dans l'histoire du développement des forêts. **[Pollination by wind and by insects in the history of forest development.]** *Acta biol., Budapest* 2 (4), 1951 (355–67). 8 refs. [F.russ.] O.R.S.

A historical and geographical survey.

1046. Langner, W. Die diagnostische Bedeutung eines Aurea-Faktors bei *Picea abies* für die genetisch wirksame Pollenverbreitung. **[The diagnostic value of an *aurea* factor in *P. abies* for assessing the genetically effective pollen distribution.]** *Abstr.* in *Z. Forstgenet.* 2 (1), 1952 (21–2). [G.]

The range of pollen spread from a single tree was studied by making counts of progeny from a yellow-leaved variety of Spruce, which gave progeny with variegated foliage when crossed with a normal tree. The results confirmed the supposition that the range of pollen distribution is limited to the immediate neighbourhood of the tree. Occurrence of seedlings with variegated foliage was reduced to 10% or even 5% at a distance of 40 m.

1047. Kohlermann, L. Untersuchungen über die Windverbreitung der Früchte und Samen mitteleuropäischer Waldbäume. **[Studies of wind dispersal of fruits and seed of Central European forest trees.]** *Forstwiss. Cbl.* 69 (10), 1950 (606–24). 23 refs. [G.g.]

Reported under the heads: (1) Shedding from the parent tree (effect of humidity on cone opening; effect of wind force). (2) Dispersal range (rates of fall; effect of turbulence; travel along the ground). (3) Density of seedfall in different directions (influence of wind direction and associated humidity variations; quantitative variation of seedfall with distance). The results in (3) relate only to Pine and

Spruce; those in the other sections to a number of German conifers and hardwoods.

1048. STELFOX, A. W. **Leaves and fruits of trees associated with snow patches at high altitudes on Ben Lawers, Perthshire.** *Watsonia* 2 (4), 1952 (284).

'Keys' of Ash, Sycamore seedlings, and Beech and Oak leaves were found on snow patches about 3 miles from any possible parent trees, having presumably been carried up from lower altitudes during storms.

1049. BURKART, A. Un árbol 'artillero' y mirmecófilo de la flora argentina, del género *Sebastiana*. **[An 'explosive' and myrmecophilous tree of the genus *Sebastiana* in the Argentine flora.]** *Darwiniana, B. Aires* 9 (3/4), 1951 (614). [Span.] A.P.B.

Notes on an individual of *S. klotzschiana* growing in the grounds of the Darwinian Botanical Institute. The fruits were observed to explode, expelling the seed with some force, while the sun was full on the tree in hot weather. The seeds are also distributed by ants, which carry them off to their nests.

1050. FERRÉ, Y. DE. Les formes de jeunesse des Abiétacées. Ontogénie—phylogénie. **[Juvenile forms of the Abietineae. Ontogeny and phylogeny.]** *Abstr. of thesis*, in *Année biologique, Paris* 27 (11/12), 1951 (771–3). [F.] O.R.S.

Results of a study on characters, at different ages, of 103 species of *Abies, Cedrus, Keteleeria, Larix, Picea, Pinus, Pseudolarix, Pseudotsuga* and *Tsuga*.

1051. DUNCAN, D. P. **The influence of temperature on the germination of Tamarack (*Larix laricina*) (Du Roi) K. Koch.** *Abstr.* in *Bull. ecol. Soc. Amer.* 32 (3), 1951 (59–60). A.P.B.

Field observations and laboratory experiments indicate that in the natural environment total seed germination is not appreciably influenced by temperature variations, but that maximum germination is earlier and germination more concentrated on unshaded than on shaded sites.

1052. KRAMER, P. J., OOSTING, H. J., and KORSTIAN, C. F. **Survival of Pine and hardwood seedlings in forest and open.** *Ecology* 33 (3), 1952 (427–30). 1 ref. [Duke University, Durham, N.C.]

Tests were made to examine the relative importance of light and water in the survival of *Pinus taeda, P. echinata, Cornus florida* and *Quercus alba* seedlings. Three sets of plots were established: (1) within a Pine stand, (2) at its northern margin, and (3) in an adjoining field. *Q. alba* survived the best in all three locations, and better in the forest than in the open. *C. florida* survived best on the margin. Survival of both species of Pine was very poor in the forest, but good on the margin and in the open. Seedlings of all four species grew most in the open and least in the forest. After four growing seasons (the last two without supplementary watering) most of the Oak and some of the Dogwood seedlings in the forest were alive, but all the Pine seedlings were dead. These results support the view that light intensity is an important factor in the survival of Pine seedlings under forest cover. [Cf. *For. Abstr.* 8 (No. 182).]

1053. WENT, F. W., JUHREN, G., and JUHREN, M. C. **Fire and biotic factors affecting germination [in chaparral].** *Ecology* 33 (3), 1952 (351–64). 23 refs. [California Institute of Technology, Pasadena.]

Studies of soil samples from burned and unburned areas show that the removal of competition is a major cause of the abundant vegetation of chaparral species in the first season following a fire. Laboratory tests give further evidence that germination of certain species of *Ceanothus, Rhus, Eriodictyon*, and *Anagallis*, can be increased by the heat of the fire, while the viability of many others is destroyed. It was also ascertained from germination records after fires, and from experimental field-plot data, that some plants inhibit germination in certain others. Among these are *Brassica nigra*, which inhibits germination of *Salvia mellifera, Rhus laurina, Spartium junceum* and *Robinia pseudoacacia. From authors' summary.*

181.6. Life Form, Habit. Post-Seedling Development and Form

See also Nos. 1420–4.

1054. FRIESNER, R. C., and JONES, J. J. **Correlation of elongation in primary and secondary branches of *Pinus resinosa*.** *Butler Univ. bot. Stud.* 10, Pap. No. 14, 1952 (119–28). 2 refs. A.P.B.

Height growth in *P. resinosa* is greater in one year than the extent of elongation in any one secondary branch for the same year. The extent of elongation for any one year decreases successively in branches from the top of the tree downward. Length of 'internodes' on secondary branches has a strong tendency to be progressively greater from the younger towards the older portion of the same branch, i.e. from the tip of the branch towards the primary axis, except for the oldest 'internodes' of each branch. In the present study, covering only the latest 8 years of growth in trees 11 years after transplanting, the amount of elongation in primary axes was successively greater each year. No correlation in primary axes was discernible with rainfall. This is probably due to the youth of the trees and also to the fact that (except in the first year) rainfall was high over the period studied. [Cf. *For. Abstr.* 5 (14–15, 92); 11 (No. 1522).] *From authors' summary.*

181.8. Phenology

See also Nos. 973, 986, 1043–4, 1429–30, 1739.

1055. LADEFOGED, K. **The periodicity of wood formation.** *Biologiske Skrifter, Kgl. Dansk Videnskabernes Selskab, København* 7 (3), 1952. pp. 98. Many refs. [E.e.] Price *Kr.*20·00.

In a study on 6 softwood and 13 hardwood species a succession of blocks was cut in 1944 from 20–25 and in 1945 from 4–10 trees of each species. Results of microscopic examination of sections are given in graphs and tables. In *Fraxinus excelsior* wood formation was found to be active at the start, half the ring being formed in May and June and very little after July. At the other extreme, in *Alnus glutinosa, Betula pendula, Fagus sylvatica, Acer pseudoplatanus* and possibly *Quercus robur*, only $\frac{1}{3}$ to $\frac{1}{2}$ the annual ring was formed in May and June, growth continued actively during August and did not cease until early September. *Picea abies* and

Larix decidua form an intermediate type. In young branches, most of the ring was formed during shoot extension, while in the stem, wood formation continued later at lower than at higher levels and in the roots often persisted into October. A positive correlation was found between temperature in April, May, June and July and the amount of wood formed. Only in *Picea abies* was protracted drought found to retard wood formation. In ring-porous species late-wood formation began about mid-June, in Beech at the end of June, in Alder in mid-July, and in Spruce and Larch in early July. The difference between the cross-section area of the conducting cells in early wood and late wood was found to be inversely proportional to the length of the period of shoot extension. The total area of conducting tissue in the ring is estimated to be 4 to 9 times as great in the conifers as in the hardwoods and about equal in the ring-porous (r.p.) and diffuse-porous (d.p.) hardwoods examined. In the r.p. hardwoods, 75% of the water is carried in the outermost ring and all of it in the outer 4 rings, while in d.p. woods only 10% is carried in the outermost ring and as many as 20 rings may be involved. The velocity of the flow of water in r.p. woods may be 10–30 times that in the d.p. species at mid-day, while in the evening and morning the two groups had similar velocities; the total flow in r.p. species was only 2–3 times that in the d.p. woods. Relevant literature is discussed in detail, and there is an extensive bibliography. [Cf. *For. Abstr.* 14 (Nos. 181, 1429–30).]

182. *Synecology, Plant Sociology: General, Principles and Methods*

See also No. 972.

182.1. Palaeoecology. History of Vegetation

See also Nos. 939, 1033, 1045, 1068.

1056. Bellot Rodriguez, F. El análisis polínico de las zonas higroturbosas de la Sierra de Gerês en relación con las presencias de *Pinus pinaster* Sol. in Ait. y *P. silvestris* L. **[A pollen analysis of the peat bogs of the Serra do Gerês with reference to the presence of *P. pinaster* and *P. sylvestris*.]** *Agron. lusit.* 12 (3), 1950 (481–91). 8 refs. [Span.f.]

The studies confirm the theory that *P. pinaster* is a comparatively recent arrival in northern Portugal, and that *P. sylvestris* is a relict species in the Serra do Gerês. [Cf. *For. Abstr.* 8 (No. 115).]

1057. Heusser, C. J. **Pollen profiles from southeastern Alaska.** *Ecol. Monogr.* 22 (4), 1952 (331–52). 78 refs.

The pollen profiles show the importance of Lodgepole Pine as an early post-glacial invader. This species was soon succeeded by a Sitka Spruce consociation and ultimately by a Western Hemlock/Spruce climax. Lodgepole Pine to-day appears only occasionally in the invasion of areas recently denuded of ice, and is almost entirely restricted to muskeg.

182.2. Succession, Alternation and Periodicity in Vegetation

See also Nos. 1057, 1084.

1058. Spurr, S. H. **Origin of the concept of forest succession.** *Ecology* 33 (3), 1952 (426–7). 9 refs.

Traces briefly the evolution of the concept from 1792 onwards.

182.4. Layer Communities

1059. Hale, M. E., Jr. **Vertical distribution of cryptogams in a virgin forest in Wisconsin.** *Ecology* 33 (3), 1952 (398–406). 6 refs.

Ten windthrown trees in the Flambeau River State Forest were examined, and quantitative data were taken. The cryptogams were found to have a definite distribution pattern along the stem, with each species reaching a maximum value of constancy at one level. Lichens exceeded bryophytes in importance at all levels except the base. The restriction of some cryptogams to particular groups of tree species may be correlated with such factors as bark pH, moisture and roughness. [Cf. *For. Abstr.* 14 (No. 941).] *From author's summary.*

187. *Vegetation Types*

See also Nos. 939, 946, 1053, 1090–2, 1101, 1104, 1111, 1788.

1060. Trautmann, W. Pflanzensoziologische Untersuchungen der Fichtenwälder des Bayrischen Waldes. **[Plant-sociological studies in the Spruce forests of Bavaria.]** *Forstwiss. Cbl.* 71 (9/10), 1952 (289–313). Numerous refs. [G.g.]

1061. Rivas Goday, S. Apreciación sintética de los grados de vegetación de la Sierra de Gerês. **[The vegetation types of the Serra do Gerês.]** *Agron. lusit.* 12 (3), 1950 (449–80 + 2 plates). 27 refs. [Span.]

1062. Silva, A. R. Pinto da, Rozeira, A., and Fontes, F. Os carvalhais da Serra do Gerês—esboço fitosociológico. **[The Oak stands of the Serra do Gerês—an outline of their plant sociology.]** *Agron. lusit.* 12 (3), 1950 (433–48 + 2 plates + 1 tbl.). 11 refs. [Port.f.]

1063. Horvat, I. Šumske zajednice Jugoslavije. **[Forest communities of Jugoslavia.]** Institut za Šumarska Istraživanja, Zagreb. 1950. pp. 73 + 21 photos, 1 map. 101 refs. [Croat.f.] Price *Din.*63.

A comprehensive study based on literature (101 references, of which ¾ are Jugoslav, including 13 papers by the author).

1064. Horvat, I. Biološki odnosi između šume i planinskih pašnjaka. **[Biological relationships between forests and mountain pastures.]** *Šumarstvo* 2 (3), 1949 (31–42). [Croat.]

Above various Oak forests at the lowest altitudes in Jugoslavia, there begins the zone of Beech and Fir forests; above the latter, in the mountains of Slovenia and Serbia (and Bulgaria) first Spruce and higher up *Pinus montana* are found; in Croatia, Bosnia and the continental part of Montenegro, sub-alpine

Beech forests, followed by *Pinus montana*; in Herzegovina, maritime Montenegro, and Macedonia, a zone of *Pinus heldreichii* (or *P. peuce*) is followed again by *P. montana*. The *P. montana* zone does not always occur between the true forests and the mountain pastures. The existence of that zone as well as the altitudes of the various boundaries (forest/stunted forest, stunted forest/pastures) depends upon a number of factors; besides human activity, the following natural causes play an important rôle: duration of snow cover, avalanches, wind, tree species, geographic location, and, most of all, the gradient of mountain slopes. Man's aim has always been to increase the area of pasture to the detriment of the stunted forest, and sometimes of forest proper, choosing primarily areas with moderate slopes. The deterioration in site factors due to the retreat of tree growth is counteracted by the vigour of the mountain vegetative cover (e.g. *Festuca* and *Sesleria*). The mountain pastures bear the imprint of the climate, viz. a short period of growth; low temperature; large temperature extremes between day and night; very strong winds and long duration of snow cover. The vegetation is usefully divided into: (1) rock vegetation, (2) gully vegetation, (3) snow vegetation, and (4) vegetation of mountain grasses and heath species. The present mountain pastures are largely derived from the upper forest zone. The line between natural and derived pastures does not occur at a constant altitude; in the Šarplanina it is ca. 2,200 m. The quality of mountain pastures depends upon three main factors: soil, predominant winds, and the duration of the snow cover. The interests of foresters and of stock breeders often conflict because the stunted-forest zone protects the lower regions from avalanches and torrents, while in the karst, they serve particularly as moisture accumulators.

1065. HATUSIMA, S., and KOMAKI, M. **Sociological studies on the forest vegetation found in the central part of Ohsumi peninsula [Kyushu]. I.** *Memoirs of the Faculty of Agriculture, Kagoshima University* 1 (1), 1952 (23–45). 5 refs. [E.e.]

The three main communities recognized are the *Distylium racemosum* association, the *Abies firma* association and the *Quercus acuta* association. The first of these, which occurs at 300–800 m. altitude, is described in detail.

1066. BOBEK, H. Die natürlichen Wälder und Gehölzfluren Irāns. **[The natural forests and open woodlands and scrublands of Persia.]** *Bonner Geographische Abhandlungen, Bonn* No. 8, 1951. pp. 62 + 4 plates + folding map in pocket. 5 pp. of refs. Price *DM*.6. [G.]

A general descriptive review.

1067. ROBERTY, G. Carte de la végétation de l'Afrique Occidentale Française. Feuille D–28–XIV: Thiès. **[Vegetation map of French West Africa. Sheet D–28–XIV: Thiès.]** Office de la Recherche Scientifique d'Outre-Mer, Paris. 1950. [F.] Scale 1:200,000.

1068. SCHNELL, R. Végétation et flore des Monts Nimba (Afrique occidentale française). **[Vegetation and flora of the Nimba Mountains (French West Africa).]** *Vegetatio* 3 (6), 1952 (350–406). Numerous refs. [F.] A.P.B.

A comprehensive study of the vegetation and history of vegetation in this region, declared a reserve in 1944. In spite of areas of savanna and grassland, the vegetation belongs to the 'Guineo-equatorial' forest. Various forest climaxes of the orders *Triplochitetalia*, *Lophiretalia* and *Parinarietalia* are represented, though the primitive vegetation has become degraded at lower altitudes through fellings, and at higher altitudes by fire.

1069. GERMAIN, R. Les associations végétales de la plaine de la Ruzizi (Congo Belge) en relation avec le milieu. **[The plant associations of the Ruzizi plain (Belgian Congo) in relation to the environment.]** *Publ. Inst. nat. Étude agron. Congo belge* (*Sér. sci.*) No. 52, 1952. pp. 321 + 83 photos. 103 refs. [F.f.] Price *Fr.*180.

1070. KRAJINA, V., and ARLIDGE, J. W. C. **Classification of Engelmann Spruce [*Picea engelmanni*]/Alpine Fir [*Abies lasiocarpa*] forest in Spa Hills, Kamloops forest district [British Columbia].** *Abstr.* in *Bull. ecol. Soc. Amer.* 33 (3), 1952 (53–4). A.P.B.

1071. KRAJINA, V. **Classification of Douglas Fir forest area on Vancouver Island.** *Abstr.* in *Bull. ecol. Soc. Amer.* 32 (3), 1951 (66–7). A.P.B.

Lists 7 forest associations, that have been distinguished and studied on Vancouver Island.

1072. HUSTICH, I. **Forest-botanical notes from Knob Lake area in the interior of Labrador Peninsula.** *Bulletin, National Museum of Canada, Ottawa* No. 123, 1951 (166–217). 33 refs. L.S.

Notes on the flora and vegetation, species occurring in the forests, the size they attain, the composition of the forests (with visual estimates of tree size, based on 26 sample plots), and regeneration. A catalogue of vascular plants of this area is appended.

1073. STOUT, B. B. **Species distribution and soils in the Harvard Forest.** *Bull. Harv. For.* No. 24, 1952. pp. 29 + 4 photos + map + 3 dgms. 12 refs.

The investigations described in this paper strongly suggest that the distribution of the major forest types in the Harvard Forest is closely related to the behaviour of a water table in the under-lying glacial deposits. In general these deposits are of relatively coarse or sandy materials, and contain relatively small fractions of silt and clay. Their capacity to support a water table, therefore, depends in part upon the proportion of fine sands or silts in them and in part on their compactness. The possible use of these findings beyond the limits of the Harvard Forest is discussed.

1074. POTZGER, J. E., and KELLER, C. O. **The Beech line in northwestern Indiana.** *Butler Univ. bot. Stud.* 10, Pap. No. 12, 1952 (108–13). 4 refs. A.P.B.

A study of changes in forest composition in this region. The progressive decline in abundance of *Fagus grandifolia* is noticeable, as the prairie border is approached.

1075. JONES, J. J. **A survey of fifteen forest stands in the Early Wisconsin Drift Plain of Indiana.**

Butler Univ. bot. Stud. 10, Pap. No. 20, 1952 (182–204). A.P.B.

1076. KUCERA, C. L. **An ecological study of a hardwood forest area in Central Iowa.** *Ecol. Monogr.* 22 (4), 1952 (283–99). 81 refs.

1077. POTTER, L. D. **Native Pines of North Dakota.** *Abstr.* in *Bull. ecol. Soc. Amer.* 32 (3), 1951 (58–9). A.P.B.

Discusses the distribution, history and site characteristics of scattered groves of *Pinus ponderosa* in the eroded land of the Little Missouri River (south-western North Dakota), the boundary of its north-eastern range.

1078. MERKLE, J. **An analysis of a Pinyon-Juniper community at Grand Canyon, Arizona.** *Ecology* 33 (3), 1952 (375–84). 37 refs.

1079. DAUBENMIRE, R. **Forest vegetation of Northern Idaho and adjacent Washington, and its bearing on concepts of vegetation classification.** *Ecol. Monogr.* 22 (4), 1952 (301–30). 64 refs.

The conifer-dominated forests of northern Idaho and adjacent Washington are classified into 13 climax plant associations, divided among 4 vegetation zones. The concept of the association as a climax phytocoenosis composed of unions, with each association characterized as a particular combination of vascular plant unions, has been found satisfactory. Associations defined in this manner are believed to be the most practical means of recognizing ecosystems, and the most fundamental bases for biogeographic classification. The concepts of the union simply as a layer, or simply as a life-form group, are not satisfactory in the vegetation studied. A union is defined as a group of plants exhibiting ecologic similarity throughout a particular vegetation matrix, such similarity being recognized principally by affinity in local distribution, although somewhat by corresponding phenologies, and to a very limited extent by equivalent life-forms as well. The associations recognized reflect primarily the reproductive abilities of vascular plant species in the face of competition. Soil pH is closely related to the association sequence, and cation capacity shows a slight tendency to increase upwards through the altitudinal series. Moisture equivalent and % saturation with H ions show little relationship to the vegetation matrix.

Some practical applications of the findings to forest and wildlife management are suggested. *From author's summary.*

1080. PARKER, J. **Environment and forest distribution of the Palouse range in northern Idaho.** *Ecology* 33 (4), 1952 (451–61). 15 refs.

1081. HANSON, H. C. **A preliminary classification of vegetation types in northwestern Alaska.** *Abstr.* in *Bull. ecol. Soc. Amer.* 33 (3), 1952 (64). A. P. B.

1082. MAACK, R. Mapa fitogeográfico do estado do Paraná. **[Vegetation map of the state of Paraná.]** Serviço de Geologia e Petrografia do Instituto de Biologia e Pesquisas Tecnológicas, and Instituto Nacional do Pinho, Rio de Janeiro. 1950. Scale 1:750,000. [Port.] I.F.B.

1083. BRAVO HOLLIS, H., and RAMÍREZ CANTÚ, D. Observaciones florístico-ecológicas en la mesa de San Diego y en su declive oriental hacia la cuenca del Río Cazones. **[Floristic and ecological studies in the San Diego plateau [Mexico] and its eastern slope as far as the Rio Cazones basin.]** *An. Inst. Biol. Univ. Méx.* 22 (2), 1951 (397–434). 11 refs. [Span. span.] C.G.B.

1084. GREIG-SMITH, P. **Ecological observations on degraded and secondary [rain] forest in Trinidad, British West Indies. 1. General features of the vegetation. 2. Structure of the communities.** *J. Ecol.* 40 (2), 1952 (283–330). 30 refs. With an appendix on soils by *F. Hardy* and *G. Rodrigues.*

1085. MORELLO, J. El bosque de algarrobo y la estepa de jarilla en el Valle de Santa María (Provincia de Tucumán). **[The Algarrobo forest and the Jarilla steppe in the Santa Maria valley (Tucumán province).]** *Darwiniana, B. Aires* 9 (3/4), 1951 (315–47 + 2 plates). 14 refs. [Span.span.e.g.] A.P.B.

Describes in some detail the two most important communities of this region: the Algarrobo forest (*Prosopis alba/P. nigra/Acacia visco* association), and the Jarilla steppe (*Larrea cuneifolia/Bulnesia schickendantzii/Plectrocarpa rougesii* association), with special reference to the subterranean root layers of each community. Wide differences exist between the root systems of shrubs in the Jarilla steppes and those of *Zuccagnia punctata* and *L. divaricata* which thrive on the banks of seasonal rivers. Both climatic changes and human activities have favoured the spread of the Jarilla steppe, while human intervention has also changed the structure of the Algarrobo forest.

1086. RUDD, V. E. **Vegetation of the Venezuelan llanos.** *Abstr.* in *Bull. ecol. Soc. Amer.* 32 (3), 1951 (60). A.P.B.

1087. **Notes to accompany a map showing the commercial forest regions of Australia.** *Leafl. For. Timb. Bur. Aust.* No. 61, 1951. pp. 29 + map.

Shows principal species in each region and distribution of average annual rainfall.

1088. COALDRAKE, J. E. **The climate, geology, soils, and plant ecology of portion of the county of Buckingham (Ninety-Mile Plain), South Australia.** *Bull. Commonw. sci. industr. Res. Organ. Aust.* No. 266, 1951. pp. 81 + 17 plates + 4 maps (separate).

The vegetation of this area is chiefly mallee scrub and heath, in varying degrees of admixture. Communities verging on sclerophyll woodland occur in the southern portion. The major plant communities are classified and briefly described. A close correlation exists between topography, soil type, and the plant communities. A detailed ecological map has been prepared from interpretation of aerial photographs.

2. SILVICULTURE

See also Nos. 1000, 1439, 1788, 1795, 1799.

1089. BICKERSTAFF, A. **Silvicultural research program of the Forestry Branch [, Canada].** *Misc. Publ. For. Br. Can.* No. 2, 1952. pp. 10. (6th British Commonwealth Forestry Conference, Canada, 1952.)

1090. WIGG, L. T. **Problems of dry forest silviculture in Tanganyika.** Government Printer, Dar es Salaam. 1952. pp. 12. 10 refs. (6th British Commonwealth Forestry Conference, Canada, 1952.)

Describes the ecological features of the *Brachystegia* woodland in Tanganyika, and enumerates the outstanding subjects for ecological, silvicultural, and utilization research with a view to deciding on the right silvicultural treatment for this type.

1091. AUBRÉVILLE, A. **Silviculture of mixed tropical rain forests.** *Proc. UNSCCUR, Lake Success, 1949* 5, 1951 (114–6).

Discusses the methods best suited to the regeneration of *Aucoumea klaineana* and other species of the Guinea/Congo forest and the cultural operations needed to build up mixed forests of valuable species.

1092. WALTON, A. B., BARNARD, R. C., and WYATT-SMITH, J. **The silviculture of lowland dipterocarp forest in Malaya.** Government Printer, Kuala Lumpur. 1952. pp. 16. (6th British Commonwealth Forestry Conference, Canada, 1952.)

A brief account is given of the geography, geology and climate of Malaya and a description of the forest, its stocking and floristic composition. The present silvicultural system of complete exploitation and natural seedling regeneration and the sequence of regenerative operations is described, with some notes on artificial regeneration. *From authors' summary.*

1093. BECKING, J. H. **Forestry technique in the Teak forests of Java.** *Proc. UNSCCUR, Lake Success, 1949* 5, 1951 (106–14). 209 refs.

1094. De populierenteelt. **[Poplar cultivation.]** *Vlugschrift Staatsbosbeheer* [, Utrecht]. 1951. pp. 14. 3 refs. [Du.]

Notes on site, choice of species, site preparation, planting, protection of young trees, tending and financial results.

22. SILVICULTURAL SYSTEMS. CONSTITUTION AND COMPOSITION OF STANDS; FORMS OF STAND

See also Nos. 1033, 1100, 1105, 1107, 1111, 1397, 1432.

221. *High Forest Systems*

1095. LEIBUNDGUT, H. Rolle und Grundlagen der Planung beim schweizerischen Femelschlag- und Plenterbetrieb. **[Rôle and principles of [silvicultural] planning in the Swiss *Femelschlag* and selection systems.]** *Allg. Forst- u. Jagdztg.* 123 (4), 1952 (93–100). 33 refs. [G.]

A review in lecture form.

222. *Coppice, Pollarding and Lopping Systems*

See Nos. 1096, 1225.

226. *Changes of Silvicultural System. Conversion (by System or Species)*

See also Nos. 1198, 1214, 1225, 1432, 1448.

1096. EBERTS, H. Waldbauliche Behandlung und Forsteinrichtung bisheriger Mittelwaldungen des südhannoverschen Berglandes. **[Silvicultural treatment and management of old coppice with standards in the hill country of southern Hanover.]** *Allg. Forst- u. Jagdztg.* 122 (4; 5), 1951 (101–6; 129–40). [G.]

Discusses from long experience the stands in this region that are still coppice-with-standards in character, whether now so managed or not, under the heads: condition and yield; previous management; future treatment, including conversion to regular high forest or the selection system; and management, with special reference to calculation of annual yield.

1097. BJERKE, S. Lidt om løvskov. **[Hardwood forests.]** *Tidsskr. Skogbr.* 60 (9), 1952 (226–30). [Nor.]

Discusses a previous article [see *For. Abstr.* 14 (No. 229)]. In the Oak forests of S. Norway where Oak regenerates easily and planting Spruce has generally been unsuccessful except on the best sites, conversion to Spruce is not considered desirable.

1098. SIRAKOV, G. Problemät za prevrăštaneto na bukovite ni gori po severnite sklonove na Stara planina v smeseni s preobladanieto na iglolistni dărvesni vidove. **[The problem of the conversion of Beech forests on northern slopes of Stara Planina [Balkan Mountains] into mixed forests with conifers predominating.]** *Sbornik na Centralnija Gorski Izsledovatelski Institut, Sofia* 4, 1948 (141–206). 69 refs. [Bulg.bulg.russ.f.]

Criticizes the current opinion in Bulgaria that coniferous species are typically hygrophytic, and states that, given sufficient soil moisture, they can withstand extreme drought. The lower parts of the Balkan slopes present very favourable climatic and soil conditions for conifers, particularly for Spruce, Scots Pine and Douglas Fir. The following average figures are given for the mixed stands in that region, the figures referring to Beech, Pine, Spruce, Fir, and Douglas Fir respectively: total yield (including branches): 6·0; 8·7; 11·6; 14·0; 18·0 cu.m./ha./year; timber yield; 3·6; 6·2; 8·1; 9·8; 12·6 cu.m./ha./year.

228. *Constitution and Composition of Stands; Forms of Stand. Tree Classes*

See also Nos. 1072, 1075, 1098, 1191.

1099. ÅKERHIELM, L. Urskogsresten på kronoparken Alanäset i Jämtland. **[The remnants of virgin forest in the crown park at Alanäs in Jämtland.]** *Svensk SkogsvFören. Tidskr.* 50 (3), 1952 (275–91). 5 refs. [Sw.sw.]

23. REGENERATION AND FORMATION OF STANDS

See also Nos. 1090–2.

1100. KRISHNASWAMY, V. S. **Silviculture—natural regeneration including artificial supplementation—tropical.** Forest Research Institute, Dehra Dun. 1952. pp. 10. (6th British Commonwealth Forestry Conference, Canada, 1952.)

Reviews the silvicultural systems in use in the various forest types of India.

[Cf. *For. Abstr.* 14 (No. 1114).]

1101. AHMAD, Y. S. **Natural regeneration including artificial supplementation—tropical.** Inspector General of Forests, Pakistan. 1952. pp. 5. (6th British Commonwealth Forestry Conference, Canada, 1952.)

Briefly reviews forest types of Pakistan and methods of regeneration employed.

1102. AUNG DIN, U. **Selection of silvicultural techniques.** *Proc. UNSCCUR, Lake Success, 1949* 5, 1951 (117–20). 6 refs.

Discusses methods of ensuring regeneration in Teak forests and the plains reserves (village supply forests) and the programme of research in Burma.

1103. EGGELING, W. J. **Regeneration and replacement problems in East Africa.** Government Printer, Dar es Salaam. 1952. pp. 3. (6th British Commonwealth Forestry Conference, Canada,1952.)

231. *Natural Regeneration*

See also Nos. 1041, 1043 *et seq.*, 1072, 1100–3, 1165, 1200, 1298–9, 1386.

1104. FANSHAWE, D. B. **Regeneration of forests in the tropics with special reference to British Guiana.** [Conservator of Forests, British Guiana?] 1952. pp. 8. (6th British Commonwealth Forestry Conference, Canada, 1952.)

The problem of regeneration of tropical forests depends largely on the gregariousness of the species required. British Guiana is favoured in this respect, in that a number of the better heavy hardwoods grow gregariously, have large seeds, great vigour, and consequent abundant natural regeneration. Where merchantable species do not grow gregariously and their seedlings are sparse and scattered, the problem is more difficult and depends largely on the areas being seeded by light hardwoods whose seeds are wind- or bird-carried.

A résumé of improvement felling technique and works already carried out is given. In a discussion of the problem, primary forest is divided into three types and the aim of regeneration in each type is given. *Author's summary.*

1105. AYLIFFE, R. S. **The natural regeneration of Trinidad forests.** Forest Department, Trinidad and Tobago. 1952. pp. 18 + 3 dgms. (6th British Commonwealth Forestry Conference, Canada, 1952.)

Describes the main problems and successes met to date in the natural regeneration of Trinidad forests. Natural regeneration under a high shelterwood of degraded forests on well drained sands is considered to be very successful. No suitable system has yet been worked out for clay soils. On the very infertile silts and gravels of north-east Trinidad, satisfactory regeneration is obtained with a shelterwood giving both low and high shade. The conversion by natural regeneration of Mora forest to mixed forest is also proceeding on the last mentioned soils. A method of regeneration by high shelterwood in combination with charcoal burning, in the Arena Reserve, is described in detail, with costs.

1106. MORELLET, J. Une expérience sylvicole au Cameroun. [**A silvicultural experiment in the Cameroons.**] *Bois For. Trop.* No. 25, 1952 (297–312). [F.e.span.]

An experiment is being made in the state forest of M'Balmayo (Cameroons), in the natural regeneration of the more valuable species. The forest is divided into plots and a team then goes in to enumerate, clean, and release seedlings, saplings and poles of the valuable species present. The native farmers are then allowed to plant food crops in the area on condition that they do not encroach on the space assigned to the valuable species. The experiment began only in 1947 and it is too soon to assess results, but the initial difficulty of training native labour to perform the work of cleaning and enumeration was overcome satisfactorily.

1107. DUNCAN, D. B. **Reproduction cutting in Tamarack.** *Minn. For. Notes* No. 7, 1952. pp. 2.

The following information was derived from study of reproduction of *Larix laricina* in Minnesota:—Good seed crops are produced only at intervals of ca. 4 years, and seed production does not begin until about 40 years of age except on open-grown trees, which often produce good cone crops from 20 years. Seeds are normally dispersed in September–October up to a distance of 1–2 times tree height, and more than 97% of total germination occurs in the following spring. Germination is earliest and most abundant in exposed, warm sites, and losses from damping off etc. are less severe among seedlings grown in full light than among those grown in shade. No seedlings over 6 years old were found in well stocked Tamarack stands.

On the basis of these findings it is recommended that, where possible, Tamarack stands should be cut in progressive strips not exceeding 2 chains in width, an adjacent strip should be cut as soon as the first has a satisfactory stand of reproduction established on it. If 2-chain clear-cut strips are placed at 12- to 16-chain intervals through the stand, by the time the final strips are cut, the first cut strips will probably carry sufficient seed-bearing trees to regenerate the latest ones. On small tracts or in mature stands where cutting cannot be postponed, winter clear-cutting of the whole stand may be undertaken after the establishment of a good crop of 1-year seedlings (at least 20,000/acre) or immediately after a good seed-year.

Available evidence indicates that a light brush cover may be beneficial, but that heavy brush is detrimental to Tamarack reproduction, and that the amount of reproduction is in inverse ratio to the density of slash on the ground.

1108. Shepherd, W. O., Dillard, E. U., and Lucas, H. L. **Grazing and fire influences in Pond Pine forests.** *Tech. Bull. N.C. agric. Exp. Sta.* No. 97, 1951. pp. 57. 11 refs.

Experiments have shown that regeneration of Pond Pine [*Pinus rigida* var. *serotina*] is favoured by grazing, probably because of disturbance of litter as well as reduction of competing vegetation. The evidence indicates that fire may be necessary for regenerating Pond Pine stands [cf. *For. Abstr.* 13 (No. 3957)]. On areas unburned for 5 years or more, average initial seedling establishment was 52/acre/year on grazed, and 9/acre/year on ungrazed plots. Immediately after an intensely hot fire, 2250 seedlings/acre became established, with a further 1700/acre in the following year. About one-sixth of this number resulted from a relatively light fire.

1109. Teikmanis, A. Om markvegetationens inflytande på uppkomsten av naturlig föryngring i Jämtlands örtrika granskogar. [**The effect of ground vegetation on the occurrence of natural regeneration in Spruce forests having rich herbaceous cover in Jämtland.**] *Norrlands SkogsvFörb. Tidskr.* 1952 (1), (1–44). [Sw.g.]

Ten sample plots, ranging in area from 50 to 182 sq. m., were laid out in clear-felled areas and openings in stands in three districts. The plots were chosen for minimum variation in factors other than soil type, moisture content and ground vegetation type. A table is given showing the situation, age and density of the stand, date of felling, size, soil type, vegetation type and moisture conditions of the plot, and the number of seedling Birch or Spruce present. On *Aconitum*-types (generally on high ground, on very moist, fertile, calcareous soils) there is little or no regeneration. On drier, less fertile sites, moderate regeneration can be expected, especially when Birch is present. On *Dryopteris*- and *Myrtillus*-types (generally moist sites, more or less podzolized) satisfactory regeneration may occur in favourable conditions, e.g. where good drainage and an adequate seed source exist and where felled areas are small, especially if there is a considerable amount of Birch in the stand. Other conditions, less common on the sites examined, that discourage natural regeneration, are dense colonies of *Aspidium filix-mas* or *Rubus idaeus*, or thick moss cover. Birch, by using a large amount of the available moisture in the soil, prevents the spread of Aconite and other ground vegetation and favours tree regeneration. The presence of fallen trees and wood waste encourages natural regeneration and further growth of conifers. Recommendations include the following: (1) Small drainage ditches should be dug immediately after felling on sites suitable for the spread of Aconite. (2) Birch should not be removed until regeneration has taken place. (3) Felling areas should be kept small, especially on moist, fertile sites. (4) On sites particularly difficult to regenerate, 3- to 5-year-old Spruce should be planted.

1110. Christodoulopoulos, A. Pyrēnes anadasōseōn. [**Nuclei of reforestation.**] *Dasos* No. 13/16, 1950 (2–4 + sketchmap). [Gk.]

At Michalaki (alt. 400 m.) in the Volos district two trees of *Pinus halepensis* var. *brutia* were planted in a garden 80 years ago, when the area was completely treeless. Round the one tree that still stands 3·5 stremmas [1 stremma = 0·247 acres] now carry 570 trees aged 25–30 years, and further trees of this age and less are scattered over an area of ca. 700 stremmas, all being derived from natural seeding.

Given protection from browsing, similar nuclei 1–2 stremmas in area could be established all over the country, so saving the prohibitive expense of large-scale plantations.

1111. Radkov, I. N. Văzobnovjavane na dăbovite gori v severna Strandža. [**Regeneration of Oak forests in the northern Strandja [Bulgaria].**] *Sbornik na Centralnija Gorski Izsledovatelski Institut, Sofia* 4, 1948 (207–50 + 3). 18 refs. [Bulg. russ.f.]

Apart from the Beech association, the area is covered by: (1) *Quercus sessiliflora*, (2) *Q. sessiliflora* + *Q. conferta*, (3) *Q. conferta*, and (4) *Q. conferta* + *Q. cerris* associations which are described in detail. Natural regeneration of Oak forests by seed gives very good results in all associations except (4) where a second storey presents an obstacle. It is suggested that a 3-phase system of progressive felling is the most suitable for the natural regeneration of all these forests.

1112. Radkov, I. N. Biologičeski osobennosti na dăbovija podrast. [**Biological characteristics of Oak advance growth.**] *Sbornik na Centralnija Gorski Izsledovatelski Institut, Sofia* 4, 1948 (77–110). 14 refs. [Bulg.russ.f.]

According to local information, complete seed-bearing in the Oak forests in the Strandja mountains occurs every 7 years, during which period there are 1–2 partial seed-years. Results of the author's observations in *Q. sessiliflora* and *Q. sessiliflora*/*Q. conferta* stands are as follows: (1) Rate of growth in diameter (at collar) and length of roots in Oak seedlings under a canopy is $\frac{1}{3}$–$\frac{1}{4}$ of that for seedlings in the open; this ratio is reduced to $\frac{1}{8}$–$\frac{1}{10}$ for the growth rate of stem diameter and height. (2) When the density of the canopy is 0·8–0·9, the reproduction dies out within 6–7 years; when the density is 0·6–0·7 —after 10–15 years, while with a density of 0·5–0·6 it forms advance growth whose roots will persist for 20–40 or more years. (3) In the first phase of growth, the roots and stem grow at an equal rate, then the stems die back and re-sprout periodically, to die out in the third phase, while the roots grow continuously; eventually, however, the roots die, mainly owing to the action of fungi; the duration of each phase depends upon the amount of illumination. (4) The half-dead roots of the third phase can be revived in favourable conditions and stems can be formed from the collar buds.

1113. Turgeon, J. C. **A mathematical study of population factors affecting new growths in forests.** *Pulp Paper Mag. Can.* 53 (10), 1952 (190, 226).

Presents, on a purely theoretical basis, a series of equations to express the density of natural regeneration from a given number of mother trees of the same age and species throughout the life of the

stand and assuming that the population of mother trees (1) remains constant, or (2) decreases at a constant rate.

232. *Artificial Regeneration*

See also No. 930.

1114. RANGANATHAN, C. R. **Selection of silvicultural techniques.** *Proc. UNSCCUR, Lake Success, 1949* 5, 1951 (95–100). 24 refs.

Discusses the failure of European natural regeneration systems in India and the development of special systems of artificial regeneration (e.g. taungya and stump planting). [Cf. *For. Abstr.* 14 (No. 1100).]

1115. GLÄSER, H. Aus dem Forstkulturbetrieb anderer Länder: ein Sammelreferat über zugängliches Schrifttum aus den Jahren 1930–1950 (Stand Februar 1950). [**Artificial regeneration practice abroad: a review of available literature of the period 1930–1950 (up to Feb. 1950).**] *Forstarchiv* 22 (3/4), 1951 (33–40). 74 refs. [G.]

Practice in the N. temperate zone, with special reference to equipment, under the headings: site preparation, direct sowing and sowing machines, aerial sowing, planting, cultivation and weeding in young plantations, fencing, nursery practice, seed collection.

1116. STENTZEL, E. Neue forstliche Kulturgeräte: Übersicht über die Entwicklungsarbeiten der letzten Jahre auf dem Gebiete forstlicher Kulturgeräte und Kulturmaschinen. [**New implements for forest plantation work: a review [of literature] on developments in implements and machines in recent years.**] *Forstarchiv* 22 (3/4; 5/6), 1951 (60–3; 86–9). 45 refs. [G.]

Covers fertilizer spreaders, equipment for soil cultivation, sowing machines, planting tools and machines, and implements for soil cultivation and weed control in young plantations.

1117. HESMER, H. Anzucht und Anbau der Douglasie. [**Nursery and plantation practice for Douglas Fir.**] *Forstarchiv* 23 (1), 1952 (1–3). 22 refs. [G.]

Summarizes German experience—from published literature, unpublished reports and personal knowledge—under the headings: provenance, nursery work (soil preparation, fertilizing, protection against sun and frost, sowings, transplanting); and plantation technique (site selection, scale of planting, mixed vs. pure stands, protective overwood against frost, spacing, planting stock, soil preparation and planting methods, planting season, heeling in, fertilizing, and protection against deer).

1118. BROOKS, J. D. **Establishing Pine plantations for pulpwood production in Australia.** *Pulp Paper Mag. Can.* 53 (11), 1952 (168–73).

Describes methods of establishing *P. radiata* used successfully on 2,000 acres during 1951 by the Australian Paper Manufacturers Ltd. It is proposed to plant about 1500 acres of Pines annually and after one thinning at 13–16 years (depending on site quality), to clear fell at 20–25 years; a plantation of this size should produce 50,000 cords of pulpwood in thinnings and final crop. In the early years additional areas, bringing the total annual area planted to 3000 acres, will be planted, and these will be harvested after about 15 years to supply pulpwood before the main plantations reach rotation age. In early spring (*a*) the area is divided into blocks of between 500 and 1000 acres for fencing with rabbit-proof netting, and prefabricated houses, sheds etc. are moved to the site; (*b*) a nursery is prepared and seed sown in 2-in. bands about 1 ft. apart, using about 25 seeds/ft. Weeding is done, but no watering. After the first autumn rains the seedlings, now 12–18 in. high, are root-wrenched and about 6 weeks later are lifted, sorted and put out in the field, using Lowther tree planters, at a spacing of 7 ft. × 8 ft. Methods of preparing the site vary. To clear dense ground-cover of *Melaleuca* spp. a heavy steel roller about 12 ft. long, fitted with cutting blades, is used; it flattens the plants and chops them up, uprooting many at the same time, and covers about 20 acres/day at a cost of about $2·20/acre. For light sapling growth a heavy anchor chain is dragged behind two International TD 24 tractors, moving parallel about 50 yards apart; with this method 40–50 acres can be treated per day at some $4·00/acre. For heavy timber with trees up to 80 ft. high and 30 in. diam., the 'Hi-Ball' method of clearing developed in Montana is used. In this the anchor chain from the two tractors is attached to a large metal ball (in this case, an old 9-ft.-diam. rotary straw-cooking boiler from one of the paper mills) to hold the chain off the ground, thus exerting greater leverage on the trees. About 40–50 acres are covered in a day at about $4·40/acre. When the debris has been heaped into windrows at costs reaching $13·00/acre in the worst areas, the land is ploughed with large 8-furrow stump-jump disc ploughs at some $4·40/acre.

1119. TEAGUE, P. D. **Aspects of Australian Pines and Products Ltd.—planting of *Pinus caribaea*.** *Aust. Timb. J.* 18 (7), 1952 (499, 509 . . . 520).

A paper read at the 1952 meeting of the Australian and New Zealand Association for the Advancement of Science, giving particulars of the position and site qualities of the company's land in New South Wales, growth of *P. caribaea* in the area, nursery practice, field techniques in clearing, planting, maintenance, pruning, thinning, and protection, some volume figures, and details of the company's plans.

232.1. Choice and Trial of Species, Races etc.

See also Nos. 951, 1029–31, 1222, 1792.

1120. ANDERSSON, E., GUSTAFSSON, Å., and JOHNSSON, H. Avkommeprövningen i skogbrukets tjänst. [**The use of progeny trials in forestry.**] *Norrlands SkogsvFörb. Tidskr.* 1951 (4), (373–409)· 16 refs. [Sw.]

Discusses the respective advantages of planting or sowing; the problem of sorting plants in plots established by planting; the size of experiment necessary to ensure the maintenance of a low mean

error, after normal silvicultural practices, through at least ⅔ of the normal rotation period; the use of control plots and replications, and different types of plan for the lay-out of experimental plots.

1121. JOHNSSON, H. Einige Fragestellungen der forstlichen Nachkommenschaftsprüfung. [**Some problems in testing forest tree progeny.**] *Z. Forstgenet.* 2 (1), 1952 (2–8). [G.e.]

A discussion of questions connected with the number of plants, size, form and number of plots, number of replications, planning of experiments and the interpretation of results.

1122. HILF, H. H., and ROHMEDER, E. Pappelsortenprüfung. [**The testing of Poplar varieties.**] *Forstarchiv* 22 (3/4; 5/6), 1951 (53–7; 80–2). 14 refs. [G.]

Defines the desirable scope of varietal trials of Poplars, and lists the characteristics to be investigated if they are to be comprehensive. Gives results of preliminary work on behalf of the Fachausschuss Pappelanerkennung im Bundesgebiet: (1) Tests of the rooting capacity of cuttings in water, using clonal material of hybrid Black Poplars, Black × Balsam Poplars, and *Populus trichocarpa*. These revealed differences indicating different physiological strains of morphologically similar clones. Three clones of the × *P. robusta* group were among the poor rooters in water and it is perhaps significant that × *P. robusta* does not thrive on wet, ill drained sites. It may well be possible by refinement and extension of this technique (e.g. controlled water-culture tests in combination with pot and nursery trials, etc.) to get early and reliable indications of other important characteristics. (2) Some preliminary results indicating differences in the climatic and soil requirements of a number of clones in open ground.

Suggestions are made for the standardization of trials as regards size and treatment of cuttings and lay-out of nursery and field trials, and the need for team work, both national and international, is stressed.

1123. MACDONALD, J. **The place of north-western American conifers in British forestry.** Forestry Commission, London. 1952. pp. 21. 14 refs. (6th British Commonwealth Forestry Conference, Canada, 1952.)

Western American conifers now account for 23% of all conifer plantations in Great Britain. Sitka Spruce covers a larger area than any other conifer except Scots Pine; Douglas Fir has been extensively used, and increasing use is being made of *Pinus contorta* [cf. *For. Abstr.* 14 (No. 1186)], *Tsuga heterophylla*, *Abies grandis*, *A. nobilis* and *Chamaecyparis lawsoniana*. The part played by these species in British forest economy is discussed.

Tables are given of the areas occupied by various age classes of each species, and of recorded height growth and volume production at various ages on selected sample plots. Notes are given on the less important forest species, namely *Chamaecyparis nootkatensis*, *Sequoia sempervirens*, *S. gigantea*, *Pinus radiata*, and *Cupressus macrocarpa*. *From author's summary.*

232.11. *Species Trials (by Localities), including Forest Gardens, Trials of Exotics etc.*

See also Nos. 1188-90.

1124. RAVE, D. Über den Anbauwert einiger ausländischer Holzarten. [**The value for afforestation of some exotic species.**] *Forst u. Holz* 7 (22), 1952 (311–4). [G.]

The author has assembled all available data on exotics first planted in 1881–90 in different forest districts of Germany, and reported on by Schwappach in 1901. For a rough evaluation of growth he has compared their height growth with the yield-table height for the appropriate site class of the tree species growing near by, or, failing this, some other species. The exotics reported on are: *Tsuga heterophylla*. *Abies nobilis*, *A. grandis*, *Thuja plicata* and *Pinus rigida*.

1125. SEIBERT, P. Die Douglasie im Stadtwald Freiburg. [**Douglas Fir in the municipal forest of Freiburg [Baden].**] *Allg. Forst- u. Jagdztg.* 122 (6/7), 1951 (158–61). [G.]

An extract from a dissertation with the same title, giving a brief account of the history of Douglas Fir plantations in this forest, with notes on site factors, yield, the Swiss needle-cast disease, and a list of the N. American localities believed to be promising seed sources for the future. The Swiss needle-cast, first recorded here in 1938, is widespread on 10- to 30-year-old trees, but is not as a rule serious. Severe defoliation is rare, occurring chiefly when humidity is high and light deficient, e.g. on moist cool northern aspects, in the shade of old forest or in over-dense plantations and mixture with Beech. [Cf. *For. Abstr.* 14 (Nos. 1324–5).]

1126. USTINOVSKAJA, L. T. Staro-Berdjanskiĭ lesnoĭ massiv. [**The Staro-Berdyansk plantations.**] *Priroda* 41 (1), 1952 (112). [Russ.] A.P.B.

These cover 927 ha. in the droughty steppes bordering the Sea of Azov, the soil being loamy sand, sandy loam, and sand. Oak stands make up 70% of the area, the oldest being 45 years old. Some 35-year-old Oak stands reach 17 m. in height. In mixed Oak/Pine stands, Oak at 18 years grows better than Pine. Ash gives satisfactory results only on the lower sites. The introduction of *Gleditsia* is not warranted. The 75-year-old stands of *Juniperus virginiana* have an average height of 8 m., average diam. 16 cm., maximum diam. 26 cm. This species is drought-resistant and frost-hardy.

1127. CHEVALIER, A. L'*Eucalyptus globulus* à la Côte d'Azur. [***E. globulus* on the Côte d'Azur.**] *Rev. int. Bot. appl. Agric. trop.* 32 (357/358), 1952 (357–60). [F.] P.R.

Describes the tree and discusses its distribution in parks and gardens and its uses for essential oil, timber, firewood and ornamental branches.

1128. MÉNAGER, H. Les *Eucalyptus* dans le Gharb (Maroc occidental). [***Eucalyptus* species in the Gharb (Western Morocco).**] *Rev. int. Bot. appl. Agric. trop.* 32 (357/358), 1952 (309–55). 18 refs. [F.] P.R.

Describes the tree and timber of 21 of the 125 species grown experimentally in W. Morocco, and discusses their hybridization, soil and climatic

requirements, essential oils, value as a honey crop, methods of planting, choice of species, and soil conservation value. The species giving the best results are *E. rostrata*, *E. cladocalyx*, *E. gomphocephala* and *E. sideroxylon*, while *E. botryoides*, *E. kirtoniana* and *E. robusta* are successful on low-lying, damp or marshy areas where other *Eucalyptus* species fail. Details are given of the extent of plantations of the different species in the area.

1129. Sardinha, A. Manuel. Os eucaliptos no repovoamento florestal da Zona Planáltica de Angola. [**Eucalypts in the reforestation of the Angolan plateaux.**] *Agros* 35 (3), 1952 (111–3). [Port.] A.P.B.

A large number of *Eucalyptus* spp. have been tried out with fair success in areas that normally support mixed populations of *Berlinia* spp., *Brachystegia* spp., and *Combretum* spp. The soils are laterite or clay-sandy and the climate is characterized by heavy rainfall (ca. 1000 mm.) in the rainy season. The following have done especially well:—*E. maculata*, *E. citriodora*, *E. smithii*, *E. propinqua*, *E. rudis*, *E. albens*, *E. oranensis*, *E. rostrata*, *E. maideni*, *E. trabuti* and *E. saligna*. *E. saligna* is specially recommended for its usefulness as a timber-producing species and source of pulpwood.

1130. Parry, M. S. **The softwood plantations of the East Transvaal and Swaziland.** *E. Afr. agric. J.* 17 (4), 1952 (188–200). 6 refs.

Gives notes on the 4 species now most used (*Pinus caribaea*, *P. patula*. *P. pseudostrobus*, and *P. taeda*), nursery practice, planting technique, spacing and tending, fire protection (largely consisting of Eucalypt firebreaks), yield, and rodent damage.

1131. Carmelich, J. N. F. Contribución al estudio del crecimiento del *Pinus taeda* L. [**The growth of *P. taeda*.**] *Rev. Fac. Agron. Vet., B. Aires* 13 (1), 1951 (26–46). [Span.span.e.]

Results of a study made in two plantations at the Facultad de Agronomía y Veterinaria, Buenos Aires University. Data are presented on the mechanical properties of the soil, soil humidity, root development, tree growth, and chemical constituents of different parts of the tree. The plantations were too small and too heterogeneous to allow any very definite conclusions to be drawn, but it was established that the roots possess great powers of penetration in clay soils, though loose, somewhat damp and permeable soils are preferable for commercial plantations. The species appears promising for the coastal provinces of Argentina.

1132. Pollock, W. P. **The silviculture of exotic conifers in New Zealand.** New Zealand Forest Service, Wellington. 1952. pp. 20. (6th British Commonwealth Forestry Conference, Canada, 1952.)

232.12. *Races and Provenance Trials*

See also No. 1125.

1133. Schmidt, W. Kurzfristige Herkunftsteste bei der Kiefer. [**Short-term provenance tests with Scots Pine.**] *Forstarchiv* 22 (3/4), 1951 (50–2). 36 refs. [G.]

Reviews literature on physiological criteria of potential value for rapid tests, viz. effects of temperature on germinative energy, and the phototropic curvature, photoperiodic reactions, and drought resistance (wilting tests) of seedlings.

1134. Rohmeder, E., and Meyer, H. 23jährige Anbauversuche in Bayern mit *Pinus contorta* Douglas (*P. murrayana* Balfour) verschiedener Herkunft. [**23-year-old trials in Bavaria with *P. contorta* of different provenances.**] *Forstwiss. Cbl.* 71 (9/10), 1952 (257–72). 10 refs. [G.] [Institut für Forstsamenkunde und Pflanzenzüchtung, München.]

A report on 23-year-old *P. contorta*, grown from seed originating in various parts of N. America, and tried out in Bavaria. The tree thrives on soils of varying geological origin, but fails on the peat soils of upland moors, and probably does not tolerate very alkaline or chalky soils. On suitable soils it rivals, and often surpasses native Pine and Spruce in height and diameter growth. Yield on nearly all trial plots averaged the same as Wiedemann's yield class I for Pine. Strains from coastal areas of Washington and Oregon throve only on warm sites under 300 m. in altitude, and with a light snowfall. For sites above 500 m., and with a high snowfall, only the seed from higher altitudes in British Columbia (500 m.) and the Oregon/California borders (1000 m.) was suitable. *P. contorta* is wind-firm, frost-hardy, and as drought-resistant as native Pines. It is however more susceptible than the native species to attack by weevils, Pine shoot moth and deer.

1135. Hough, A. F. **Preliminary results of Red Pine seed-source tests in northwestern Pennsylvania.** *Sta. Pap. Ntheast. For. Exp. Sta.* No. 49, 1952. pp. 28. 15 refs.

As a result of tests on seed from 50 sources and an analysis of climatic factors, recommendations are made for seed sources for the northern Allegheny Plateau.

1136. Hough, A. F. **Relationships of seed source, seed weight, seedling weight, and height growth in Kane test plantation.** *Sta. Pap. Ntheast. For. Exp. Sta.* No. 50, 1952. pp. 14. 11 refs.

Correlations between seed source and seed weight for seed from 50 sources were found, but variations within seed-source regions were too great for seed weight to be used in identifying seed source. Correlations were found between seed weight and dry weight of 2 + 0 seedlings. Significant relationships were found between green weight of 2 + 1 seedlings and subsequent height growth. No correlation could be found between dry weight of 2 + 0 seedlings from the Lake States Forest Experiment Station and the green weights of bundles of 2 + 1 seedlings, grown from the same seed collections, in the Kane Experimental Forest. In the Kane plantation study, Pine trees with a high initial green weight grew at a greater rate during the second 5 years than in the first 5 years after plantation establishment. In the medium and small weight classes, growth tended to fall off during the second 5 years.

232.13. *Trials of Hybrids and Other Products of Tree Breeding*

See No. 996.

232.3. Seed, Nursery Practice, Direct Sowing

232.31. *Seed*

See also Nos. 1344, 1384.

232.311. Seed Production (Seed Years, Seed Crops etc.)

1137. Jansen, E. C., and Broekhuizen, J. S. van. Selectie van de groveden (*Pinus sylvestris* L.). **[Selection of Scots Pine.]** *Ned. Boschb.-Tijdschr.* 24 (11), 1952 (289–303). 5 refs. [Du.e.]

Describes the work since 1948 of the Werkgroep voor de Selectie en de Veredeling van de Groveden [Committee for the Selection and Improvement of Scots Pine] in classifying stands over 25 years old, containing over 30% good trees (judged by eye). Sample plots were laid out in each stand, the number and size of the plots being determined by the size of the stand and the number of trees it contained. All the trees in the sample plots were examined and classified according to straightness of stem (the lower part of the stem up to the crown, and the upper part of the stem were classified separately, the lower part as 1, 2 or 3, and the upper as 1, 2, 3, or 4: the quality figures were then added and trees with a sum of 2 or 3 were put in class A, of 4 in B, of 5 in C and of 6 or 7 in D); branch angle; crown form and crown regularity (classification by the factors so far considered is illustrated in diagrams); health of tree; and dominance. Records were also made of stand ownership, situation, soil, vegetation etc., d.b.h., and attacks by *Evetria buoliana*. As improvement of stem form is the main aim in selection, stand classification was made on this basis; class I ('plus' stands) having more than 70% of the trees in stem-form class A, or more than 85% in A + B with A at about 50%; class 2 having A between 50 and 70%, or more than 80% in A + B with A between 30 and 50%; and class 3 having A between 30 and 50%, and A + B above 65%. Only 40 ha. of 'plus' stands were recorded but a further 100 ha. could be obtained by removing inferior trees up to a thinning grade (spacing/top height) of 23%. These stands have been recorded as suitable for seed collection. A number of 'plus' trees (straight lower and upper stem, height growth above the stand average, and a fairly broad, deep and regular crown) have also been recorded and are being propagated vegetatively.

232.312. Seed Collection, Extraction and Grading

See also Nos. 937, 1136.

1138. Wendel. Ein bewährtes Sammelgerät für Bucheckern. **[A proven apparatus for collecting Beech nuts.]** *Forst u. Holz* 7 (20), 1952 (281). [G.]

Essentially a frame supporting 2 sieves of different mesh. It can be purchased from Wiedemann & Söhne, Holzwarenfabrik, Ingelfingen (Hürtt) for ca. DM.30.

1139. Carmichael, A. J. **Ladders as an aid to seed collection.** *Tree Plant. Notes* No. 5, 1951 (3–6).

Describes the principal types in use in N. America.

1140. Pospíšil, J. Jak získáme čisté osikové semeno. **[How to obtain clean Aspen seed.]** *Čsl. Les* 31 (18), 1951 (393–4). [Cz.]

After a preliminary hand-sieving (for gross impurities), it is possible to separate the seeds of Aspen or Willow from the floss by means of a kind of vacuum-cleaner (type V-200 made in Czechoslovakia). The seeds collect at the bottom of the cleaner just below the aspirating socket, while the floss etc. goes to the top, round the cage.

232.315. Seed Storage and Treatment

1141. Sato, Y. **On the viability of Willow seeds (*Toisusu urbaniana* Kimura).** *Res. Bull. exp. For. Hokkaido Univ.* 15 (2), 1952 (255–62). 11 refs. [Jap.e.]

Seeds of *Salix urbaniana* collected in July 1950 gave 89% germination. They were stored (1) in sealed bottles or in bottles containing a vacuum, at different temperatures; (2) with various amounts of adsol (a desiccating agent) at − 8° C.; or (3) with various amounts of adsol and constant amounts of K_2S at − 8°. Their viability was closely related to temperature, storage at − 8° giving the best results. Seeds stored in a vacuum at any temperature below air temperature showed prolonged viability, and at − 8° germination was 19·3% after 535 days. Germination of seeds stored with twice as much adsol as seed was 38·3% after 535 days, against 19·6% with equal amounts of adsol and seed. Seeds stored with adsol and K_2S showed a high germination %—in most cases over 60% after 535 days—irrespective of the quantity of adsol.

1142. Hatano, K. **The germination of Hazenoki (*Rhus succedanea* L.) seeds treated with sulphuric acid. I and II.** *Journal of the Japanese Forestry Society, Meguro, Tokyo* 32, 1950 (185–8); 33, 1951 (218–21). From *abstr.* in *Rec. Res. Fac. Agric. Univ. Tokyo* No. 1, 1950/51 (1952), (61). [E.]

The permeability of the endocarp to various concentrations of H_2SO_4 was tested by a new apparatus. The optimum time for immersion of the seeds in conc. H_2SO_4 to ensure germination was found to be 1–4 hr. After H_2SO_4 had permeated the endocarps, a long time elapsed before the seeds became damaged by the acid.

232.32. *Plant Rearing. Nursery Practice*

1143. Nilsson, K.-E. Något om mekanisering och rationalisering av skogsplantskolor: en studieresa till danska plantskolor. **[Mechanization and rationalization of forest nurseries: a study tour of Danish nurseries.]** *Norrlands SkogsvFörb. Tidskr.* 1952 (2; 3), (156–73; 331–54). [Sw.]

1144. **[Rationalization of nursery practice.]** *Lesn. Práce* 31 (6), 1952. [Czech.].

The issue includes 8 contributions on this subject, by 7 Czechoslovak and one Polish author.

1145. Svatoš, F. Lesní velkoškolky v ČSR, jejich účel, současný stav a otázka jejich dalšího

vývoje. [**Large forest nurseries in Czechoslovakia, their purpose, present state, and the problem of future development.**] *Lesn. Práce* 31 (6), 1952 (241–6). [Cz.]

1146. Polanský, B. Otázka nejvhodnějšího typu lesních školek pro československé lesní hospodářství. [**Forest nursery type most suitable for Czechoslovakia.**] *Lesn. Práce* 31 (6), 1952 (247–9). [Cz.]

One-hectare nurseries are recommended for routine work. The furrow width should be 10 cm., and the inter-furrow distance 45 cm. Large nurseries are proposed only for afforestation on a large scale.

1147. Pietkiewicz, K. Několik úvah o lesních školkách v Polsku. [**Some remarks on forest nurseries in Poland.**] *Lesn. Práce* 31 (7), 1952 (306–9). [Cz.]

To avoid soil erosion, and following Russian practice, permanent nurseries consist of 3 to 8 areas used in rotation for (1) fallowing, (2) seedlings, (3) two-year plants, (4) transplanted 3-year plants, (5) perennial grasses, (6) legumes etc. In Polish nurseries, weeding and soil loosening are done with mechanical cultivators, manual work being confined to the rows themselves. Cultivation is repeated 5–6 times during the growing season, beginning one week after germination. Winter sowings are protected from frost with straw, which after the spring germination is replaced by reed mats. A table gives the weight of seeds of 13 species sown per running metre and per ha. Another table gives the collar diameter of 1- to 2-year-old plants (10 species), and the lengths of stem for two plant grades.

1148. **Milton adapts tractors to special uses.** *Amer. Nurserym.* 96 (6), 1952 (13).

Brief notes, with photographs, of adaptations of standard tractor equipment, built for its own use by the Milton Nursery Co., Milton, Ore. (1) Standard tractor built up with 6-ft. clearance for cultivating two full rows at once. (2) Same built-up model with two transplanters. (3) Ditto with spraying equipment (sprays 5 rows at once). (4) Tree digger built up from crawler tractor (clearance 4 ft.). (5) A sawdust spreader.

232.322. Preparation and Treatment of Soil, including Maintenance of Fertility

See also Nos. 1037, 1172.

1149. Němec, A. K otázce použiti kapucínu k hnojení kultur. [**Use of 'kapucin' [soft lignite] for fertilizing forest plants.**] *Sborn. čsl. Akad. zeměd.* 25*B* (2), 1952 (97–104). 18 refs. [Cz.cz.russ.e.] C.G.B.

Gives the results of chemical analysis of 'kapucin', a soft lignite found in Bohemia, containing little mineral nutrient and many trace elements, the main constituents being humic acids (up to 70%), and having a very strong acid reaction. Recommends the use of 'kapucin' along with ground diabase, which neutralizes the acids. Trials with this compound fertilizer have been started.

1150. Themlitz, R. Bewertung von Hüttenschlacken für forstliche Düngung. [**Appraisal of foundry slags for forest fertilizing [liming].**] *Forstarchiv* 22 (9/10), 1951 (143–6). 8 refs. [G.]

Reports briefly on the author's small-scale experiments with a number of German foundry slags containing 39–54% CaO and 2·5–6% MgO. For adjusting soil pH, most of these were ca. half as effective as pure $CaCO_3$, but their base content and particle size were useless as indexes to their value for this purpose, and tests on two different soils showed that one and the same slag could have very different effects on different soils. In a further experiment, screefed plots on a biologically active soil were covered in June 1950 with raw Spruce humus (1) untreated, or with lime mixed in, before spreading, as (2) $CaCO_3$ or (3) one of 3 different slags. After 8 months (1) showed no earthworm activity and no noticeable change from its initial state; (2) had been almost completely incorporated by earthworms into the mineral soil, and (3) varied as regards earthworm activity and degree of incorporation according to the slag used, but none of the slags approached $CaCO_3$ in effectiveness. Tests of the humus at the end of the period revealed that although both $CaCO_3$ and the slags had produced very favourable changes in pH, exchangeable CaO and citric-acid-soluble P_2O_5, only $CaCO_3$ had caused any significant increase in N content. It remains to be shown by further investigation whether the apparent inhibition of biological activity by the slags is related to their sulphide content.

1151. Grant, W. **The Dunemann system of nursery practice.** *Quart. J. For.* 46 (4), 1952 (247–50 + 1 plate).

This system, now widely used in Western Germany, consists in sowing forest seeds in a compost of pure Spruce needles. The framework of the beds is made of wooden sides and ends, 14 in. high and ca. 3 ft. wide. The side pegs to which the boards are fixed are extended ca. 18 in. above the top of the beds, and cross sections are fitted to form a canopy over which lath shades can be rolled, or conifer branches spread. The beds are then filled with pure Spruce needles, which are firmly trodden and watered in to within 2 in. of the top, and subsequently smoothed and rolled. A very thin sprinkling of Beech mould finely rubbed down, is applied on top of the compost to a depth of $\frac{1}{8}$ in. to act as a germinating medium. The seed is sown broadcast and a further dressing of Beech mould then applied and the surface consolidated by applying firm pressure with a board.

Once the seed has been sown, the beds should be lightly shaded with conifer branches (ca. half shade) and must be kept well watered. This is normally done once daily, preferably in the late evening. From this point on, the compost begins to decompose and germination to take place. The compost offers very light resistance to growth of root hairs, so that plants grown in this way have remarkably bushy root systems. During decomposition, N is constantly being released and absorbed freely by the plants, giving rise to unusually strong development. The growing season is longer than in ordinary seedbeds, continuing well into late November. The most important feature of this system, however, is that it completely eliminates weeding in seedbeds. These beds can be formed on any type of ground,

but there is a complete absence of weeds. Another advantage is the complete absence of frost heaving. Sowing densities may be almost twice as great as in ordinary ground.

Seedlings are sometimes lined out after one year in the seedbeds; sometimes they are left in the seedbeds for 2–3 years and then planted out directly into the forest. When seedbeds are cleared, the used compost is spread as a top dressing on the transplant lines. The purpose of this is threefold: it improves the texture of the soil; it prevents excessive drainage of surface water; and it prevents excessive growth of weeds in the transplant lines. On the whole it appears that the Dunemann system produces bigger, stronger, and more balanced plants than are produced under ordinary seedbed conditions, and the saving in weeding costs is of great significance.

232.323. Sowing and Covering

1152. KRAHL-URBAN, J. Die Bedeckungstiefe bei Eicheln, Roteicheln und Bucheln. [**Depth of covering for seed of *Quercus robur* s.l., *Q. borealis*, and *Fagus sylvatica***]. *Forstarchiv* 22 (3/4), 1951 (57–8). 5 refs. [G.]

Briefly summarizes the results of parallel sowing trials in a forest nursery and at the Botanical Garden of the Hann.-Münden Forestry Faculty, on the basis of which the following sowing depths, in cm., are recommended for light, medium and heavy soils, in that order: *Q. robur* s.l. and *Q. borealis*—4–12 (8), 3–10 (6), 2–6 (4); *F. sylvatica*—2–4 (3), 2–3, 1–2.

232.325. Tending (in both Seedbeds and Transplant Beds)

1153. STOECKELER, J. H., ROE, E. I., and SOWASH, R. O. **Allyl alcohol for weed control in forest nurseries.** *Tree Plant. Notes* No. 7, 1951 (10–2).

Tests at nurseries in Minnesota and Wisconsin showed that allyl alcohol [cf. *For. Abstr.* 14 (No. 288)] gave excellent control of weeds when applied as a spray to the soil of seedbeds 7–10 days before sowing. It also increased the density of the coniferous seedling stand, presumably by control of damping-off fungi. The drawback to its use is its inflammability and toxicity to humans. Dosages and costs are given.

1154. LANQUIST, K. **Allyl alcohol application through the overhead sprinkler system.** *Tree Plant. Notes* No. 7, 1951 (12–3).

Explains, with diagram, a device for injecting allyl alcohol (an effective selective herbicide very dangerous to handle) into the overhead sprinkling system of a nursery.

232.327. Protection Measures in Nurseries

See also Nos. 1160, 1311–2.

1155. ZENTMYER, G. A., BAKER, K. F., and THORN, W. A. **The rôle of nursery stock in the dissemination of soil pathogens.** *Abstr.* in *Phytopathology* 42 (9), 1952 (478–9).

Phytophthora cinnamomi was isolated from a large number of species in S. Californian nurseries. It is suggested that the movement of nursery stock may be the primary means by which the pathogen becomes so widely distributed.

1156. HENRY, B. W. **Ethylene dibromide controls a root rot at the W. W. Ashe nursery.** *Tree Plant. Notes* No. 7, 1951 (2–4).

Loss of Southern Pine seedlings, believed to be due to nematodes, in a Mississippi nursery has been controlled by injecting Dowfume W-40 (a 20% by weight solution of $EtBr_2$) to a depth of 6 in. into the seedbed 2–3 weeks before sowing.

232.328. Vegetative Propagation

See also Nos. 993, 1026, 1028, 1122.

1157. WELLS, J. S. **Pointers on propagation: young and old wood.** *Amer. Nurserym.* 96 (9), 1952 (11, 68–9).

Most varieties of *Taxus* root best if a piece of old wood is left at the base of the cutting; *Thuja* spp. root best from old wood; *Juniperus* does better from young shoot cuttings.

1158. KRJUKOVA, L. N. Iskusstvennoe razmnoženie samšita pobegami. [**Propagation of *Buxus sempervirens* by cuttings.**] *Bot. Ž.* 37 (1), 1952 (65–6). 2 refs. [Russ.] C.G.B.

About 3000 cuttings (mostly terminal with last year's woody tissue, a smaller number of young non-woody ones, and ca. 100 older ones) of *B. sempervirens*, each having not fewer than 5 developed internodes, were planted in hotbeds after having been kept in water for 1–3 hours between cutting and planting. Nearly all (360) of the non-woody cuttings, being insufficiently shaded, perished; 96·4% of the woody cuttings struck root, the first roots appearing within 10 days. The cuttings were transplanted into the open 61–63 days after cutting; the roots averaged 5–6 in number and 7–8 cm. in length. The older (4–5 years) cuttings did best.

1159. TODA, R. **Obtaining rooted cuttings from a mature Kiri tree (*Paulownia tomentosa*).** *Journal of the Japanese Forestry Society, Meguro, Tokyo* 32, 1950 (241–3). From *abstr.* in *Rec. Res. Fac. Agric. Univ. Tokyo* No. 1, 1950/51 (1952), (67). [E.]

Of 14 root cuttings taken, 10 rooted but made no shoots, while the remaining 4 gave 8 shoots from which 20 leaf buds and 6 short tips were collected. Nearly all the cuttings taken from these shoots rooted successfully, while stem cuttings collected directly from the trees all failed to root. [Cf. *For. Abstr.* 8 (No. 90).]

1160. WATERMAN, A. M., and ALDRICH, K. F. **Surface sterilization of Poplar cuttings.** *Plant Dis. Reptr.* 36 (5), 1952 (203–7). 7 refs. A.P.B.

Presents the results of various test treatments of Poplar cuttings in an attempt to find a method of preventing the spread of disease during the exchange and distribution of cuttings. While no treatment gave complete sterilization, the following had no toxic effect on the plants, and gave satisfactory control of three leaf- and stem-infecting fungi: dormant cuttings were dipped individually for 4–5 seconds in a saturated solution of $HgCl_2$ in 70% alcohol. They were not rinsed, but shipped immediately and stored at a low temperature. Before planting, ½ in. is cut from each end of the cuttings. This treatment, however, has little or no effect on infection by *Septoria musiva* or *Dothichiza populea*.

1161. Jovanović, S. Podizanje topolovih kultura. **[Growing Poplars.]** *Šumarstvo* 4 (6), 1951 (349–58). [Serb.f.]

Gives detailed information on the technique of preparing cuttings (length to contain at least 3 buds, the distal buds being not less than 5 mm. from the ends of the cutting; the best cutting period being either in autumn immediately after leaf-shedding or early in spring), the use of growth substances, the technique of grafting, choice and cultivation of soil, and planting (depth, spacing). Includes a few observations on Poplar plantations in Serbia. (1) A dense and unthinned stand of 'Canadian' Poplars in Crna Šuma near Bezdan has suffered greatly from insect and fungus pests, while scattered trees in Black Locust stands are strong and healthy. (2) Excessive thinning can cause over development of branches and crown die-back.

1162. Kirwald, E. Weidenanbau gegen Bodenerosion: zur Behandlung der Weidenstecklinge. **[Planting Willows for erosion control: treatment of the cuttings [with the proprietary growth substance 'Belvitan'].]** *Forstarchiv* 22 (11/12), 1951 (165–7). [G.]

Gives results of a small-scale experiment with cuttings of *Salix viminalis*, in which the optimum treatment (as judged by number, length and weight of shoots 1 year after planting) proved to be 0·5 g. Belvitan in 5 litres water, with a soaking period of 36 hr. Illustrates some common faults in propagation, e.g. poor preparation of cutting, shallow planting, slant-planting, disregard of polarity, use of short cuttings on dry gravelly sites.

1163. Andersson, E., and Jansson, B. O. Frilandsympning av barrträd vid Brunsberg, Fiskeby, Hällefors och Uddeholm. **[Grafting conifers in the open at Brunsberg, Fiskeby, Hällefors and Uddeholm.]** *Årsberätt. Fören. Växtförädl. Skogsträd 1951*, 1952 (72–89). 13 refs. [Sw.]

Some of the common types of graft are described with illustrations and their value in grafting conifers is discussed. Results of grafts in 1949–51 are tabulated and include the following: (1) In 1949, 60% of field grafts on Pine (grafts on suitable stocks from natural regeneration) that were waxed immediately after grafting were successful, as against 21% for unwaxed grafts. (2) In 1950, 50% of grafts of *Abies nordmanniana* on *Picea abies* and 41 of 42 grafts of *Pinus murrayana* on *P. sylvestris* were successful. (3) In 1951, results of grafting on Pine nursery stock were poorer with scions from over 425 m. above sea level than with those from 300–325 m. (24·1 and 48·8% successful grafts respectively) because of the smaller dimensions of the scions from the higher altitude. (4) With Pine scions collected 3–4 months before grafting and stored in an ice-chest, there was no significant difference between those soaked in water at 0° C. for 15 hr. immediately before grafting and those left untreated, nor between scions collected on 20 March and on 30 April. When storage conditions were less suitable, however, scions collected near the time of grafting gave better results, and when the scions had dried out, soaking for 15–24 hr. was found desirable. (5) Side splice grafts and side slit grafts gave good results on Pine, but the choice of method depends on the relative diameters of stock and scion. [Cf. *For. Abstr.* 13 (No. 3794).]

1164. Sulik, J. Pokusy s vegetativnym množením limby (*Pinus cembra* L.). **[Tests on the vegetative propagation of *P. cembra*.]** *Pol'ana* 7 (11/12), 1951 (214–6). [Slovak.]

The average seed harvest of *P. cembra* in Slovakia does not exceed 15–16,000 seeds, equivalent to 15–16 ha. of planted forest per year. In order to find a speedier method of regeneration, tests on vegetative propagation were started in summer 1948. Cuttings taken from trees growing at various altitudes did not develop a sufficient root system, although soils of various degrees of acidity, with and without various growth substances were used. On the other hand, good results were obtained by side grafting *P. cembra* scions on to 3- to 4-year-old *P. sylvestris*, *P. montana*, *Larix*, and *Picea abies*. The graft was made just above the root-collar; the plants were then kept for some time under glass cloches, and in late autumn 1949 the cambial tissues had united well and the scions were developing new buds. Early in 1950 the stock was cut back to just above the union, leaving strong plants corresponding to 4- to 5-year-old nursery plants.

232.329. Miscellaneous (including Greenhouses, Frames, Raising in Pots, Tubes etc.)

See No. 1189.

232.33. *Formation of Stands by Direct Sowing*

See also Nos. 1188, 1223, 1237–8, 1292.

1165. Sirén, G. Paksusammaltyypin metsien uudistamisesta: lyhennelmä metsäviikon aikana pidetystä esitelmästä. **[The regeneration of Spruce forests on the thick moss type (HMT).]** *Metsät. Aikak.* 1952 (6/7; 8), (175–80; 226). [Fi.e.]

To improve regeneration on [Cajander's] HMT-type forest in Lapland, thorough burning followed by drill sowing on cleared patches, or, especially on soils liable to frost heaving, strip sowing is recommended. Curves are presented to show that the HMT type is comparable with the EVT type. If forest labour is scarce and seed plentiful, sowing could be done from the air. As a temporary solution, HMT forests could be burnt over and seed trees left. It is emphasized, however, that the best solution is thorough burning plus sowing or planting with Pine. *From author's summary.*

1166. Tirén, L. Om försök med sådd av tall- och granfrö i Norrland. **[Sowing experiments with Pine and Spruce in Norrland.]** *Medd. Skogsforskn-Inst., Stockh.* 41 (7), 1952. pp. 110. 48 refs. [Sw.e.] Price *Kr.*5.

The material is derived from experiments from 1943 to 1949 on about 70 sites, using 24 sowing methods. The plots were arranged in block experiments with replications. Descriptions of the plots are given in tabular form, showing position and altitude, soil and vegetation types, dates of felling, burning and plot establishment, degree of moisture, and an assessment of the working difficulty. Tables include average results of square patch sowing,

number of plants/100 viable seeds (plant %) in square-patch and strip sowings, and survival quotients after 1, 5 and 10 years on burnt and unburnt sites. Some of the results are discussed. Square-patch sowing and strip sowing averaged the same plant %. The plant % for Pine and Spruce was the same on burnt sites but in some years was higher for Pine than for Spruce on unburnt sites. It was lower above than below 400 m. altitude. Some examples are given illustrating the use, in estimating the amount of seed required or the success of sowings, of tables showing the calculated % of empty patches for square and strip sowing on burnt and unburnt sites after 1, 5 and 10 years when the average number of plants per seed patch in the first autumn is known, and also the permissible number of empty patches in the 10th year for different numbers of seed patches/ha. and different spacings. There is a full English summary and legends to tables and figures are given in English.

1167. Quintus, R. L. **Direct seeding studies in the eastern Oregon Ponderosa Pine region.** *Res. Bull. Ore. Bd. For.* No. 6, [1952?]. pp. iv + 34. 11 refs.

Summarizes the results of a number of studies, with particular reference to the protection of seed spots from rodents. On the whole it is concluded that conditions in Oregon, particularly the seasonal distribution of precipitation and the light pumice soils, are unsuitable for direct sowing of Ponderosa Pine.

1168. Woods, J. B., Jr., and Hann, J. H. **Preliminary report: The Cochran airplane seeding experiment.** *Res. Bull. Ore. Bd. For.* No. 2, 1949. pp. 36. 4 refs.

After poison-baiting for rodent control, 500 acres of the Tillamook burn were sown from the air in 1945–6 at 0·5 lb./acre with a mixture of equal weights of *Pseudotsuga taxifolia* and *Chamaecyparis lawsoniana*. Stocking surveys made after ca. 6, 12, 18, 24, and 36 months showed germination and survival of *C. lawsoniana* to be generally unsatisfactory. Stands of *P. taxifolia* averaging at least 750/acre were established on sites with favourable aspects and favourable soil and cover conditions; stands of 330–749/acre on sites with favourable aspects but less favourable soil and cover conditions, or unfavourable aspects but favourable soil and cover conditions, and 95–329/acre on sites with unfavourable aspect, soil and cover conditions. Total cost per acre, including poison-baiting was $5·32. [Cf. *For. Abstr.* 12 (No. 273).]

1169. Lindgren, Å. Ett nytt såddredskap. **[A new sowing tool.]** *Skogen* 37 (5), 1950 (102). [Sw.]

A brief account of a tool for spot sowing which consists essentially of two concentric tubes serving as containers for seed and covering material (e.g. sawdust) respectively, with a mechanism for delivering each alternately. This mechanism [not illustrated] is operated by a handle ca. half-way down the tool, so that it is not necessary for the workman to bend very low. The bottom of the tool is provided with a fan-shaped distributing device which ends in a flat plate ca. 14 cm. long—used for making a small drill of compacted soil in the seed spot by light pressure on the tool. The model described is a prototype which is the subject of a patent application. Some improvements remain to be made, but in small-scale trials, using sifted, rather dry sawdust as the covering medium, its performance was satisfactory. The tool can be adjusted to sow various quantities of seed per spot, and if no special covering is to be used, both of the containers can be filled with seed.

232.4. Formation of Stands by Planting

See also Nos. 930, 1237–9.

1170. **Tree planting instruction sheets.** *Tree Plant. Notes* No. 10, 1952. pp. 40.

A collection of instruction sheets issued by a number of agencies (public and private) in the U.S.A.

232.41. *Planting Stock (Type, Handling and Treatment)*

See Nos. 1189, 1292.

232.42. *Methods of Planting (including Use of Fertilizers etc.)*

See also No. 936.

1171. Nerincx, E. À propos d'une plantation de peupliers à l'aide d'explosifs. **[Planting Poplars with the help of explosives.]** *Bull. Soc. for. Belg.* 59 (8/9), 1952 (400–4). [F.]

Planting holes for 250 Poplars were made in very heavy soil covered with vegetation, using explosives to loosen the soil. At each planting point a charge was inserted in a hole 80 cm. deep. The explosion, the effect of which could not be felt at a distance of 4 m., loosened a mass of soil of 3-4 cu. m. This part of the work was completed by 4 men in a day of less than 8 hours. Planting was left for a fortnight to allow the soil to settle, and then completed in one day by 8 men. Figures are given showing the saving in labour costs by the use of explosives. The method is considered economic if at least 100 trees are to be planted and labour is scarce.

1172. Ignatieff, V. [Editor]. **Efficient use of fertilizers.** *FAO agric. Stud.* No. 9, 1949. pp. 183. Many refs.

Contains chapters by a number of contributors covering different aspects of plant nutrition and the use of composts, inorganic fertilizers, organic manures etc. in different parts of the world.

1173. Hausser, K. Ergebnisse der neuesten Aufnahme des Owinger Forstdüngungsversuchs. **[Results of the most recent survey of the Owingen fertilizer trial.]** *Allg. Forst- u. Jagdztg.* 122 (1), 1950 (23–7). 7 refs. [G.g.]

Gives results to 1949 of a trial begun in 1906 during the afforestation of pasture land at Owingen bei Hechingen, Württemberg, on keuper and lias loams, with pure Spruce. The chief result is to show the lasting benefit of fertilizing the site, before planting, with superphosphate or superphosphate + Kainit (the addition of which gave only a small extra effect); the uncertain effect of $(NH_4)_2SO_4$; and the insignificant effect, on this site, of liming.

1174. Němec, A. Meliorace podzolu se stmelencem v polesí Žehrov hnojením čedičovým prachem. [**Improvement of podzol with hard-pan in the Žehrov forest district by using basalt dust.**] *Sborn. čsl. Akad. zeměd.* 25*B* (2), 1952 (83–96). 3 refs. [Cz.russ.e.] C.G.B.

Gives results of experiments to improve degraded sandy soil by adding 1 kg. of basalt meal with or without 1 kg. of limestone to each plant individually either in the planting holes before planting, or round the plant after planting. *Alnus glutinosa* and Oak [*Quercus robur* s.l.?] showed improved growth after this treatment as also did an underplanting of *Fagus sylvatica* in an old Pine stand. Best responses were obtained by adding basalt + limestone. The responses are not pronounced until the 3rd year after application. The basalt, with or without limestone, has caused a considerable increase in the N and Ca contents of *A. glutinosa* leaves. Evaluation of Ca requirements shows that the quantity of basalt needed is at least 2 kg. per plant and this is confirmed by experiments with *A. glutinosa* and *Carpinus betulus*. Addition of basalt to the planting holes gave better results than broadcasting. *Acer* sp. and *Ulmus* sp. responded very little to the treatment. [Cf. *For. Abstr.* 14 (No. 1198).]

1175. Lentzen, M. Der Walbecker Hohlbohrer. [**The Walbeck semi-circular planting spade.**] *Forstarchiv* 22 (3/4), 1951 (58–9). [G.]

The tool, which has a wooden handle, weighs 1·85 kg., and is produced by the Rittergut Walbeck bei Geldern, Niederrhein, is described and a brief account given of its merits and mode of use, with figures for performance and planting costs. It is suitable for planting 1- to 2-year-old conifers and hardwoods, and for lifting and planting balled stock, with unskilled labour.

1176. **Tree-planting machines.** *Tree Plant. Notes* No. 2, 1951. pp. 10 + 2.

A list, with brief descriptions, of the tree-planting machines commercially available in the U.S.A. and Canada.

233. *Afforestation*

See also Nos. 959–62, 1030, 1173, 1197, 1223, 1818–9, 1821, 1833–4.

1177. Areses Vidal, R. Las repoblaciones forestales en Galicia, como negocio. [**Reforestation in Galicia as a business undertaking.**] II Congreso Nacional de Ingeniería, Instituto de Ingenieros Civiles de España, Madrid 1950, Vol. IV, 1951 (139–55). [Span.]

A study of the economic aspects of reforestation in the Cies Islands. Probable returns in cu.m. and pesetas are estimated from 300 ha. planted to *Pinus pinaster* and managed on a 25-year rotation. These figures are made the basis of a discussion of the business aspects of such an undertaking.

1178. Christodoulopoulos, A. Dasē eis ton kampon tēs Thessalias. [**Plantations in the plain of Thessaly.**] *Dasos* No. 6/7, 1948 (3–12). [Gk.]

This agricultural plain, some 2,600,000 stremmas [1 stremma = 0·247 acres] in area, was denuded of its last few trees in 1940–1, for village fuel. To meet the annual needs of the 60,000 families in the plain (ca. 30,000 cu.m. timber and 120 million okes [1 oke = 2·8 lb.] firewood) the Government had taken the following steps: (*a*) drainage operations, interrupted by the war after 600 km. of drains had been made; (*b*) terracing, check dams and other soil improvement works plus afforestation (between 1936 and the war 3 million transplants were put in). The author details the plans and estimates drawn up for long-term rehabilitation, including drainage (18,000 stremmas), catchment (100,000 stremmas) and marsh (135,000 stremmas) afforestation, Poplar and Cypress windbreaks for farms, and 360 km. of road avenues. So far, money has been found only for two large new nurseries (one of 100–120 stremmas) which were started in 1948. Some 25–30 years and colossal sums of money will be needed to complete the project.

1179. Mpenos, G. Ta dasika paragōgika erga tēs Thessalias. [**Forestry work in Thessaly.**] *Dasos* No. 10, 1949 (8–22). [Gk.]

Deals chiefly with afforestation work done after World War II and gives figures for: (1) Nursery plant production for 1946/47–1948/49 in the old nurseries in Volos, Larisa, Trikkala and Karditsa districts, allocation of the plants, and areas planted, with nursery and planting costs, and an estimate of production for 1949–50 at the two new large nurseries in Larisa and Karditsa districts. (2) Post-war timber outturn and its cost from the Kalampaka-Grevena, Elassona and Larisa Forests. (3) Post-war torrent-training and catchment afforestation on 4 streams, with costs.

1180. Townshend, G. M. **Agrisilviculture.** *Emp. For. Rev.* 31 (3), 1952 (225–6).

Proposes a method of reclaiming waste land by fertilizing with sewage, growing fodder crops (dredge corn, kale, beet etc.) for 3 years and then planting Japanese Larch and Birch in 1 : 2 line mixtures.

1181. Moore, P. **Scots Pine on a disused and burning coal tip.** *Quart. J. For.* 46 (4), 1952 (250–5).

The northern side of one of the many disused colliery tips to be found throughout the Forest of Dean was planted with Scots Pine by the owners of Cannop Colliery between 1937 and 1940 for amenity purposes. Poor soil conditions, grazing by sheep, heating by fire, atmospheric impurities, and attacks by barkbeetles led to heavy losses in stocking. Despite these losses the resulting tree crop has succeeded in concealing the desolate outline of the tip and part of the cost of planting is offset by the value of the trees as pitwood. *From author's summary.*

1182. Rüedi, K. Die Aufforstungen im Gebiete des Kraftwerkes Rupperswil. [**Afforestation in the neighbourhood of the Rupperswil dam.**] *Schweiz. Z. Forstw.* 103 (9/10), 1952 (256–68). [G.f.]

The devastated woodland, banks of dykes, and old gravel pits round the Rupperswil dam were roughly levelled, and covered with 20–30 cm. of soil over the coarse gravel. The difficulties of afforestation were increased by two dry years, but good

success was obtained with well rooted 1- to 2-year-old Robinia seedlings at a rate of 5000–10,000/ha. After a few years other species can be interplanted.

1183. Ginnasi, G. Il cipresso sul pliocene imolese. [***Cupressus sempervirens* on the pliocene [clays] round Imola.**] *Monti e Boschi* 3 (9), 1952 (413–19). [It.f.e.]

The soils of the 'calanche', barren sites near Imola, consist of 72% clay and 11% sand, with a considerable content of calcareous materials, and a pH of 7·3. They are also poor in N. The author discusses the planting of *C. sempervirens* on these sites, citing successful plantations on similar soils in Tuscany.

1184. Simon, G. Rentabilité du boisement des dunes maritimes. **[The net financial yield of afforestation of maritime dunes.]** *Rev. for. franç.* 1952 (10), (709–13). [F.]

Analyses costs, receipts etc. for some 500 ha. of Pine plantations established in 1943 on sand dunes in S.W. France, for which records were kept until the scheme was wound up in 1943.

1185. Messines, J. **Sand dune fixation and afforestation in Libya.** *Unasylva* 6 (2), 1952 (50–8).

A general discussion of the problems involved and some indication of methods already tried and species recommended.

1186. Brown, J. M. B.; Zehetmayr, J. W. L.; Macdonald, J. A. B. **Afforestation of moorland.** *Nature, Lond.* 170 (4331), 1952 (734–6).

Summarizes the following papers read at the British Association meeting in Belfast, 1952: The role of indicator plants in moorland afforestation (*J. M. B. Brown*); Recent work on the problems of moorland afforestation (*J. W. L. Zehetmayr*) [cf. *For. Abstr.* 13 (No. 1179)]; The place of *Pinus contorta* in British sylviculture (*J. A. B. Macdonald*) [cf. *For. Abstr.* 14 (No. 1123)].

1187. Gerhard, H. Hundert Jahre Heideaufforstung in Schleswig-Holstein. **[A hundred years of heath afforestation in Schleswig-Holstein.]** *Forst u. Holz* 7 (19), 1952 (269–72). [G.]

History and past methods with recommendations for future work.

1188. **[Afforesting grasslands by direct sowing of *Gmelina arborea*.]** *Rep. For. Dep. Sierra Leone 1950*, 1952 (7).

Washed and unwashed seeds of *G. arborea* in quantities ranging from 5 to 10 seeds per stake, with staking at 7 × 7 ft., were sown in late June or early July on 3 types of natural vegetation; degraded savanna with *Lophira alata* dominant and short grasses, mixed savanna with tall grasses, and an area originally planted with *Cassia*, which had died back. The following conclusions are drawn from the results: the seeds should be freed of pulp before sowing, at least 10 seeds should be sown per stake, earlier sowing would probably give better results and taungya methods are likely to give the best results.

1189. Essais de reboisement. **[Experiments in reforestation [of savanna].]** *Rapp. Inst. nat. Étude agron. Congo belge 1951*, 1952 (55–7). [F.]

Experiments were made with a number of species intended to create the forest conditions necessary for the establishment of valuable tree species in savanna. The most successful of the species tested were *Harungana madagascariensis*, *Uragoga pedunculatis*, *Triumfetta tomentosa* and *Xylopia aethiopica*. *Musanga smithii* gave good results, but is much browsed by antelopes. *Bixa orellana* and *Flemingia* sp. need too much care to be really useful for this purpose. Cuttings of *Alchornea cordifolia*, *Millettia versicolor* and *Manihot glaziovii* rooted well.

Of the more valuable species, to be introduced at a later stage, the best were *Canarium schweinfurthii*, *Entandrophragma angolense*, and *Chlorophora excelsa*. The importance of the microclimate to the establishment of these and similar species on savanna, is emphasized. Planting stock should be either seedlings raised in baskets, or stumps, and stumps are to be preferred for their greater ease of transport and hardiness.

1190. **[Afforestation of semi-wanda areas.]** *Rep. Dep. Agric. Zanzibar 1950*, 1952 (15–6).

Trial plots were instituted ca. 1947 to determine the possibility of afforestation of bush country consisting mainly of *Heteropogon contortus* sward on coral soils. Best results to date have been obtained with *Casuarina equisetifolia*, *Terminalia catappa*, *Calophyllum inophyllum*, *Eucalyptus* sp., *Cassia siamea* and *Acacia auriculiformis*. Less successful but still remarkably good growth has been achieved with *Tectona grandis*, *Ceiba pentandra*, *Bridelia micrantha*, *Chlorophora excelsa*, *Acacia decurrens*, *Pithecellobium saman* and *Pterocarpus indicus*. The following show little promise of being suited to wanda conditions: *Sapium sebiferum*, *Sapindus saponaria*, *Eugenia jambolana*, *Vitex cuneata*, *Mangifera indica*, *Sterculia alata*, *Prosopis juliflora*, *Pterocarpus dalbergioides* and *Sorindeia madagascariensis*. In these trial plantings, seedlings were planted in holes prepared in the coral rock and filled with soil. Experiments are now being made with sowings.

235. *Underplanting, Advance Planting etc. Nurses and Formation of Mixtures. Interplanting of Inferior Growth*

See also Nos. 1180, 1189, 1305, 1332.

1191. Kühnle. Das Plenterunterholz. **[Selectively treated underwood.]** *Allg. Forst- u. Jagdztg.* 122 (8), 1951 (221–6). [G.]

For the purposes of this article, the author defines a healthy forest soil as one in which plants characteristic of soils free from humic acids—especially the more valuable hardwoods—show abundant natural regeneration, urging that soils should be restored to and maintained in this condition chiefly by biological means, i.e. by suiting the vegetation to the site. He suggests from long experience that the problem of securing maximum increment of high-grade timber, combined with the best care of the soil, may be solved by keeping the overwood (1- or 2-storeyed) relatively open to give access to light, warmth and rain, and introducing an underwood—e.g. of Beech—for soil protection. Once the canopy has been

opened sufficiently, preferably by removal of weak co-dominants, and the natural or artificial underwood established, the underwood should be treated selectively by thinning from above as necessary. Since its primary function is to protect the soil, it must not get too high (the optimum for Beech being ca. 10 m., giving ca. 9 m. of clear bole on the crop trees of the overwood). As a guide to the success of such treatment, the author has used his criterion of the healthy soil, i.e. the appearance of abundant seedlings of trees and other plants characteristic of good soils, together with thinly scattered tufts of grass. In his experience [given in general terms only] the presence of a quasi-natural underwood so distributes game damage that it is negligible and fencing is unnecessary; the forester has great freedom as regards the treatment of the crop trees without danger to the stand or soil; and, once conversion is complete, pruning should be unnecessary.

1192. Ford, H. F., and Williamson, M. J.; Cunningham, F. E. **Cover crops no substitute for cultivation in hybrid Poplar plantings.** *Ntheast. Res. Notes Ntheast. For. Exp. Sta.* No. 14, 1952 (1–4).

Five Poplar clones were planted at Beltsville, Md., as cuttings, along with 10 cover crops in an attempt to control weeds without cultivation. Measurements after 2 growing seasons showed that, although the cover crops kept down weeds, they inhibited the growth of the hybrid Poplars. These were less than half the height of the Poplars on control plots which were cultivated but had no cover crop. In the spring of 1950, 8 different cover crops were tried in plantations of 5 different Poplar clones in the Hopkins Memorial Experimental Forest at Williamstown, Mass. Here the cover crops failed to keep out weeds and after 2 growing seasons the average height of the trees in the cultivated control plots was 5·25 ft. and in the cover-crop plots 2·43 ft.; brome and millet retarded Poplar growth most, and lotus and lespedeza least.

1193. Bacon, D. W. G. **The silviculture of Mvule [*Chlorophora excelsa*].** *Emp. For. Rev.* 31 (3), 1952 (226–7).

Results of trial planting of *C. excelsa* in *Terminalia* woodland [cf. *For. Abstr.* 11 (No. 1753)] indicate that freedom from grass (especially *Hyparrhenia*) may be an important factor in success, and that the high, light shade previously noted as useful for establishing Mvule is not a direct factor, but acts by discouraging such grasses.

1194. Gouget, P. Étude sur la forêt de Makak-Nyong (Cameroun). Essais d'interprétation des résultats obtenus par la méthode d'enrichissement en layons. **[A study of the forest of Makak-Nyong (Cameroons). Interpretation of the results obtained from enrichment by line planting.]** *Bois For. Trop.* No. 22, 1952 (87–95). [F.e.span.]

[Cf. *For. Abstr.* 9 (No. 2161); 10 (pp. 447–54).] Gives costs and results. Most success has been obtained with *Khaya ivorensis*, *Entandrophragma cylindricum*, and *Lovoa klaineana*, in that order.

236. *Care of Regeneration or Plantations in the Initial Stages of Establishment (including Regeneration Surveys)*

See also Nos. 1106, 1196, 1300 *et seq.*

1195. Bever, D. N. **A study of a stocking survey system and the relationship of stocking per cent as determined by this system to number of trees per acre.** *Res. Bull. Ore. Bd. For.* No. 1, 1949. pp. 40 + 4 gphs. 11 refs.

The sampling system employed in Oregon in making regeneration surveys by the stocked-quadrat method, was investigated and found to be statistically satisfactory.

237. *Amelioration of Forest Sites*

See also Nos. 951, 1172–4, 1180, 1191.

1196. Mařan, B., and Lhota, O. Vliv kypření na vlhkost půdy a vzrůst sazenic. **[Effect of soil loosening on soil moisture content and growth of plants.]** *Za Socialistické Zemědělstvi, Praha* 2 (10), 1952 (1187–95). [Cz.] C.G.B.

Presents the results of tests on the effect of soil loosening on various properties of the soil and on the growth of plants of several tree species. Water was imbibed to a depth of 2 cm. in 0·22 min. in a loosened soil, whereas controls took 18·42 min. Comparative times for 5 cm. depth were 7·57 and 192·91 min. Analogous differences were found for the time of infiltration of 1 litre of water into the soil, irrespective of whether the soil was dry or once irrigated before the test. The moisture content of the first 80 cm. of soil during a rainy spell was 3·7–5·2% higher in soil thrice loosened in June–August than in controls. This excess was 4·4–16·6% in a dry spell. Comparative determinations of the momentary and absolute moisture and air content of the soil, and of its porosity, showed that loosened soil had a higher momentary moisture content and absolute air content, and greater porosity than controls, while the momentary air content was smaller, and the absolute moisture content was practically the same. Growth tests on 3 plots [(1) untreated control; (2) weeds mown in 1951, cultivated between tree rows; (3) weeded clean, soil loosened thrice a year] showed that both the height of plants (*Caragana* sp., Oak, Lime, *Lonicera* sp.) and the assimilation area of their leaves were greatest in (3), less in (2) and least of all in (1). The same order was observed in plant survival.

1197. Lundberg, G. Skogsdikningarna på Bjurfors kronopark: en sammanfattning av resultat och erfarenheter. **[Forest drainage in the Bjurfors state forest: a summary of results.]** *Skr. K. Skogshögsk., Stockh.* No. 8, 1952. pp. 93. [Sw.g.] (*Suppl.* to *Svenska SkogsvFören. Tidskr.* 50 (2), 1952.) Price *Kr.*5.

On the basis of observations and results over more than 50 years, on draining wet peat sites, recommendations are made on the lay-out of drainage systems and on silvicultural methods on drained soils. The results on different sample plots are discussed in detail and tabulated, showing treatment

and yields from different species. Sites for drainage were selected by the mineral content of the soil, depending on the supply of minerals washed down from higher mineral soils. The sites of this nature drained in the Bjurfors area nearly all yielded productive forest soils with annual increment figures ranging from 5 to 18 cu.m./ha., or an average increment roughly double that of moraine soils in the area. These figures are, however, higher than could be expected in wetter areas with a poorer subsoil, and particularly in central Norrland. On drained sites Spruce grew more rapidly than Pine or Birch, because of its smaller light requirements, but, because of its susceptibility to frost damage, it could be grown on drained soils in this area only under a nurse crop of Pine or Birch. Any trees and shrubs already on the drained areas were left unfelled and unthinned for several years (3–4 on the better and up to 10 on the poorer sites) because their transpiration accelerated the effect of draining. Where seed trees were plentiful, Spruce regeneration was often found under a thick stand of Pine or Birch. After draining, the Spruce quickly caught up with the other species, which were gradually removed. Natural regeneration in the final pure Spruce stands was easily obtained by the group system. Areas covered with old or stunted Birch were underplanted with Spruce. On drained areas without tree cover, natural regeneration by Birch, often mixed with Pine or Spruce, almost invariably occurred without any preliminary cultivation within 5–8 years after drainage; protection from grazing was essential to ensure satisfactory regeneration. Where Pine was preferred to Birch as a nurse crop, better and cheaper results were obtained by planting 1 + 1 plants than by sowing, and better growth was obtained by planting on raised inverted sods or on ploughed ridges than directly in the peat surface; the addition of mineral soil in the planting holes or ridges had no appreciable effect.

1198. Konias-Mottl. Dosavadní výsledky meliorace degradovaných lesních půd pod borovými porosty na diluviálních píscích v Opočně. **[Results of the amelioration of degraded forest soil under Pine stands on diluvial sands at Opočno.]** *Čsl. Les* 31 (19), 1951 (419–20). [Cz.]

To improve the poor, dry mineral soil, degraded by Pine monocultures, it is intended to introduce into the stands up to 20% of soil-improving hardwoods (mainly *Tilia cordata* and *T. platyphyllos*, also Beech and Hornbeam), and 40% of Oak, leaving only 40% of Pine. The total regeneration period is to last 40 years. The first measure consists in winter clear-felling of trees in circular areas of ca. 20 m. diameter (roughly the height of the trees), the centres of the circles forming squares of 60–65 m. side. After some 10 years, similar clear fellings are made in the centres of the squares, so that ultimately the centres of adjacent circular areas are ca. 45 m. apart. In summer, the soil in the felled areas is cultivated, and 70 kg. of ground gabbro-diorite quarry waste and 70 kg. of ground limestone are used for covering each area of 20 m. diameter. Birch is sown late in summer; next year, 1- to 2-year-old *Alnus glutinosa* is planted at 2·4 × 2·4 m. spacing and 2-year-old Spruce at 1·2 × 1·2 m. When these subsidiary species are 30 cm. high, 1- to 2-year-old Lime, Beech, and Hornbeam are planted at 1·2 m. spacing. Oak is sown on an annular strip ca. 7–10 m. broad round the circular area. Sound Pine stems are not felled.

238. *Timber Plantation Crops requiring Special Treatment*

See Nos. 951, 991, 1026–8, 1094, 1122, 1161, 1171, 1192, 1855.

1199. Beard, J. S. **Tree farming in South Africa.** *Emp. For. Rev.* 31 (3), 1952 (184–91 + 5 photos). 6 refs.

By 'tree farming' is meant the growing of trees on a short rotation as a whole-time occupation. The article describes particularly the plantations of Wattle for tanbark, Eucalypts for mine timber, *Populus deltoides* for match stock, and exotic Pines. Brief silvicultural notes are given.

24. TENDING OF STANDS AND TREES

241. *Cleanings*

1200. Andersson, S.-O. Några synpunkter på röjning i naturliga föryngringar. **[Cleaning in natural regeneration.]** *Norrlands SkogsvFörb. Tidskr.* 1952 (2), (174–83). [Sw.] (*Medd. SkogsforsknInst., Stockh., Ser. Uppsatser* No. 25.)

An analysis was made, before cleaning, of the height-range within different crown layers on an area carrying about 21,000 Pine and Spruce plants/ha. with total height ranging from a few cm. to 4·3 m., and ages up to 25 years. A cleaning was finally made, leaving the majority of plants in the crown layers 17 to 34 dm.; this involved a heavy thinning from below, and the removal of only a few of the tallest trees. A comparison showed that the height range obtained was almost identical with the average on 11 plantations in central Sweden containing a certain amount of natural regeneration.

242. *Thinnings*

See also Nos. 935, 1161, 1453–4, 1564–5.

1201. Christie, J. M. **'Smallwood' from conifer thinnings.** *Quart. J. For.* 46 (4), 1952 (243–6).

A difficulty which faces many woodland owners is the disposal, particularly from early thinnings, of 'smallwood'—i.e. that part of the tree which is from 3 in. to 1½ in. top diameter o.b. From a first thinning this may amount to as much as one-third of the total thinning volume. Hitherto, much of this material has been wasted, but there is a growing demand for it for paper pulp and building board, and how far this market can be developed appears to depend very largely on the possibility of framing accurate estimates of the amount of 'smallwood' likely to be available over a long term of years.

This article, based on a large number of measurements, shows that the 'smallwood' part of the tree has a more or less constant average volume of a quarter of a Hoppus ft. o.b., and that for the range of data covered by the paper the average volume of

'smallwood' removed per acre in thinning young plantations is about 80 Hoppus ft. o.b. The tables given are averages from a considerable number of State forests scattered throughout the country and may be of assistance in estimating the possible yield of 'smallwood' from any particular estate or forest. *Author's summary.*

1202. ENGLE, L. G., and SMITH, N. F. **Red Pine growth ten years after thinning.** *Pap. Mich. Acad. Sci.* 36, 1950 (1952), (101–9). 7 refs. L.S.

Presents the results of a study of 10 years' growth of *Pinus resinosa* in northern Michigan on (1) a 27-year-old plantation; and (2) a 43-year-old dense natural stand of the same species. Diameter growth in both stands, and height growth in the natural stand, were significantly improved by thinning. Total volume increment per acre was about the same on both thinned and unthinned plots. The data indicate that a Red Pine stand needs thinning when tree spacing is less than 20% of the total height.

1203. WORTHINGTON, N. P., and ISAAC, L. A. **Experimental thinnings in young Douglas Fir.** *Repr.* from *Northw. Sci.* 26 (1), 1952 (1–9). [Pacific Northwest Forest and Range Experiment Station.]

Reports the results of experimental intermediate fellings on trial plots, established in 1934–7 in the Olympic National Forest, Washington. A second thinning was made in 1949 and measurements of growth were kept. For comparative purposes similar records are given for a 56-year-old plantation in Denmark. The results indicate that thinnings may begin when the stand is 30 years old, and should be light and frequent as a precaution against windthrow.

1204. MITSCHERLICH, G., and GANSSEN, R. Die Ergebnisse zweier Buchendurchforstungsversuche in höheren Lagen des Schwarzwaldes. **[The results of two Beech thinning trials at the higher altitudes in the Schwarzwald.]** *Allg. Forst- u. Jagdztg.* 123 (1), 1951 (1–15). [G.]

Describes and gives data up to 1950 on the increment, development as regards value, stem quality, crown development and regeneration of Beech stands at (*a*) Schönau (1190 m.) and (*b*) Todtmoos (960 m.) in which thinning trials were started in 1891, when the stands were polewoods respectively 80 and 70 years old. Though both trials were unsuitably sited (Beech would now be used only as an admixture to conifers at these altitudes), begun at an advanced age and with a faulty experimental design, they give some indications that may be useful for older stands in similar circumstances. Results at (*a*), where the intention was to compare 3 grades of low thinning, show chiefly the dangers of generalization. Here the lowest thinning grade, which removed only a few dead and dying trees and should be counted as unthinned, gave the greatest volume and value increment. This is attributed to the climate, which, while restricting height growth and crown development, is sufficiently wet to allow a large number of trees/ha. to maintain themselves. The better diameter increment of the individual trees in the thinned stands has not compensated for the higher gross volume increment of the unthinned stands, and the latter have a higher proportion of well formed trees. In (*b*) no reliable information was obtainable on the main problem set—the merits of thinning from above and below as regards volume and value increment. In other respects, thinning from above had some advantages in that it produced trees with better stem form and a longer clear bole, and regeneration was less advanced, thus giving the manager a freer hand with future treatment; whereas in the low-thinned stand a decision will soon have to be made on the future of the crop versus that of the regeneration. It is inferred that after removing wolf trees, young Beech stands should be left to make sufficient height growth and to secure self-pruning, before thinnings are made which involve selection of the crop trees. The stands in this trial had varying admixtures of Silver Fir and Spruce, and there are indications that up to some point which cannot yet be defined, the presence of such admixtures will increase the value yield of the stand, but that thereafter competition between Beech and the conifers will reduce the value of the total increment.

1205. WAHLENBERG, W. G. **Thinning Yellow-Poplar [*Liriodendron tulipifera*] in second-growth upland hardwood stands.** *J. For.* 50 (9), 1952 (671–6). 11 refs.

243. *Opening of the Canopy (Increment, Overhead Release and Improvement Fellings)*

See also Nos. 1300 *et seq.*, 1345.

1206. STOECKELER, J. H., and ARBOGAST, C. **Power-saw girdling saves time in timber stand improvement.** *Tech. Note Lake St. For. Exp. Sta.* No. 383, 1952. pp. 1.

Girdling cull trees with a 1-man power saw reduced actual time expended by two-thirds and cash outlay by about one-half as compared with axe girdling in tests in second-growth hardwoods in the Argonne experimental forest. Average, including walking time, was 2·26 min./tree for power-saw and 6·10 min. for axe girdling. Cost of labour + power-saw rental was 5·25 cents per tree as against 12·2 cents for axe girdling.

1207. BENNETT, A. L. **Planning chemical girdling for large scale pulpwood production.** *Pa. For. Wat.* 4 (4), 1952 (88–91, 95). 3 refs.

Notes on an improved bark-girdling instrument, a tank- or pressure-fed paintbrush outfit for applying the chemical, and on the organization of personnel and planning of work.

1208. AREND, J. L., and COULTER, L. L. **Frill girdle tests with 2,4,5-T in Lower Michigan.** *Tech. Note Lake St. For. Exp. Sta.* No. 385, 1952. pp. 1.

Frill girdles were made on Scrub Oak, Aspen, and Red Maple at different seasons, using 2,4,5-T ester in concentrations ranging from 1 to 10% by volume (4 to 40 lb./100 gal.) applied in water or diesel-oil carrier. All trees treated with the oil carrier had dead tops by the end of the first growing season regardless of concentration or of the season of application. Reaction of trees treated with water carrier, however, varied with both. A 2% concentration in water did not give a satisfactory kill. Scrub White Oak treated in the dormant season

with a concentration as high as 10% failed to show any effect two growing seasons later. About 50% of trees treated with a 1% concentration in oil re-sprouted but sprouts were less numerous than on trees treated with 2,4,5-T in water. Diesel oil is easier to handle than water at temperatures below freezing point.

1209. Essais orientatifs d'annélation et d'empoisonnement. **[Experiments in girdling and poisoning.]** *Rapp. Inst. nat. Étude agron. Congo Belge 1951*, 1952 (34). [F.]

The following were found to be susceptible to girdling during the vegetative rest period: *Combretodendron africanum*, *Ferdinandia adolphi-frederici*, *Erythrophleum guineense*, *Guarea cedrata* and *G. laurentii*, *Dialium excelsum*, *Albizzia* aff. *sassa*, *A. ferruginea*, and *A. ealaensis*, *Chlorophora excelsa*, *Carapa procera*, *Beilschmiedia corbisieri*, *Antrocaryon micraster*, *Fagara lemairei*, *Macrolobium macrophyllum*, *Vitex* sp., *Lecanodiscus* sp., *Pachylobus edulis*, and *P. yangambiensis*.

1210. **Disposal of *Ficus* trees.** *Rep. Conserv. For. Ceylon 1951*, 1952 (G9).

Experiments were made to determine the dosage of Na_2HAsO_3 for poisoning *Ficus* trees. Results indicate that the choice of points for the introduction of the poison is more important than the amount of poison used. Holes should be bored on the anastomoses of the complex system of conducting panels of which the trunks of *Ficus* trees are composed.

245. *Tending of Trees, Pruning etc.*

See also No. 938.

1211. **Research on pruning.** *Rep. For. Prod. Res. Bd., Lond. 1951*, 1952 (55–6).

Some 2900 pruned knots in home-grown Sitka and Norway Spruce logs have been examined from 76 trees and 29 localities. Measurements of over 1200 of these knots have shown an average radial healing thickness of just under 0·5 in. of wood. It appears that if a British-grown Sitka is pruned in successive operations to 6, 16 and 26 ft., as soon as the side branches are dead to the height concerned, and if the healing wood over dead stubs is about the same in thickness as over green-pruned stubs, the healed knotty core should have a maximum diameter of about 5·5 in., i.e. less than $\frac{1}{4}$ of the total volume of the same log if felled at a diameter of 13 in. when about 50–60 years old. Dissection showed no obviously diseased knots or wood, but symptoms were found in the bark similar to those associated with attack by *Stereum sanguinolentum* or other fungi; it is recommended that green pruning of Spruce should normally be avoided in Britain. Pine and Douglas Fir appear to be more resistant to green pruning. [Cf. *For. Abstr.* 12 (No. 2958).]

1212. Nylinder, P. Om kvistning. **[Pruning.]** *Norrlands SkogsvFörb. Tidskr.* 1952 (2), (196–208). [Sw.] (*Medd. SkogsforsknInst., Stockh., Ser. Uppsatser* No. 26.)

Discusses the best position for the cut, the healing process, the susceptibility of Swedish species to decay after pruning, selection of trees, and tools.

1213. Wenzl, H. Wunden und Wundbehandlung bei Gehölzen. **[Wounds and dressing of wounds in trees.]** *Flugblatt Bundesanstalt für Pflanzenschutz, Wien* No. 76, 1952. pp. [2]. [G.]

25. TREATMENT OF DEFECTIVE, DERELICT OR VERY OPEN STANDS

1214. Sánchez Cózar, S. La regeneración y repoblación arbóreas, como factores de la revalorización forestal. **[Regeneration and reforestation as factors in reconstituting forest areas.]** II Congreso Nacional de Ingeniería, Instituto de Ingenieros Civiles de España, Madrid 1950, Vol. IV, 1951 (127–36). [Span.]

The area covered by *Quercus suber* in Spanish Morocco amounts to about 110,000 ha., but more than 70,000 ha. of this consists of scrub woodland. Conversion of some of this scrub to high forest was begun in 1940, and to-day more than 20,000 ha. have been converted, and now contain stems more than 8–9 m. high. Sample plots were established and diameter and height growth recorded. Tables giving some of these figures are presented and costs discussed. The author concludes that, if a choice exists between conversion to high forest and reforestation, the former should be chosen. Since growth is much quicker, individuals have a better chance of survival, and costs are less.

26. FORESTRY IN AGRICULTURAL AND PASTORAL AREAS (INCLUDING SHELTERBELTS AND THEIR TREATMENT)

261. *Alternate Forestry and Agriculture, Periodic or Temporary Agricultural Use of Forest Land*

See Nos. 946, 1106.

262. *Fuel and Fodder Forests*

1215. Étude des 'nkunku' et de la recolonisation forestière en savane. **[A study of 'nkunku' and of the recolonization of savanna by forest species.]** *Rapp. Inst. nat. Étude agron. Congo belge 1951*, 1952 (53–4). [F.]

'Nkunku' are artificial shrub formations created by the natives of the Lower Congo. They originated in the period of tribal migrations and were a means of taking possession of, and indicating property in, the soil for the future benefit of the descendants of the maternal clan. They incidentally provided a source of fruit and often protected a village from fire. Floristically the nkunku are indistinguishable from natural savanna except for the presence of fruit-bearing species.

1216. Leggat, G. ***Eucalyptus* in the urban and rural economy of Uganda.** *E. Afr. agric. J.* 17 (4), 1952 (176–8). 5 refs.

An account of the fuel plantations established at various times since 1916.

266. *Shelterbelts, Windbreaks*

See also Nos. 1818–20.

1217. Bülow, A. von. Windschutzfibel: kurze Anleitung zur Knickanpflanzung und Ödlandaufforstung. **[A primer of protection against wind: a**

short guide to hedge planting and afforestation of waste land.] Verlag Heinrich Möller Sohne, GmbH, Rendsburg. 1951. pp. 39. [G.] Price *DM*.1·20 (3*s*.).

Discusses the problem in Germany, specially in Schleswig-Holstein, and the lay-out of shelterbelts and hedges, lists species suitable for the main (N.S.) and subsidiary (E.W.) hedges, and for planting on waste ground, and discusses briefly wind protection in marshland and timber yields.

1218. Erfbeplanting. [**Farm plantings.**] *Vlugschrift Staatsbosbeheer, Utrecht* [1952?] pp. 12. 7 refs. [Du.]

A brief account of windbreak and hedge planting on farms, with recommendations for species for different types of soil.

1219. Steubing, L. Die Bedeutung von Windschutzanlagen für das Mikroklima. [**The influence of shelterbelts on microclimate.**] *Dtsch. Landwirtsch.* 3 (10), 1952 (523–6). 10 refs. [G.g.]

A discussion, based mainly on German and Soviet literature, of wind-direction and force, temperature, conditions of moisture and CO_2 balance, brought about by shelterbelts and hedges.

1220. Jones, M. D., and Brooks, J. S. **Effect of tree barriers on outcrossing in corn.** *Tech. Bull. Okla. agric. Exp. Sta.* No. *T*-45, 1952. pp. 11. 6 refs.

An experiment was conducted near Stillwater, Oklahoma, during 1948, 1949 and 1950, to determine the effect of a tree barrier separating a field of Yellow Surcropper dent corn and a field of Honey June sweet corn, on purity of the sweet corn seed produced. The tree barrier was, for half the field, a single row of trees and underbrush and for the remaining half a double row of trees and underbrush. Data are presented for the area behind the single barrier and behind the double barrier, and the differences are discussed. The data obtained from behind the two types of barrier were combined and compared with similar data obtained from isolations of various distances without such a barrier. The results indicate that the tree barrier was effective in reducing the amount of outcrossing 50% immediately behind the barrier when compared with the outcrossing obtained at the same distance but without a barrier, but was less effective at greater distances behind the barrier. The tree barrier reduced outcrossing to amounts similar to 15 rods distance without a barrier, but was not as effective as a planting of border rows of corn occupying an area equal to the area occupied by the tree barrier. Border rows appear to function primarily in producing masses of pollen to dilute pollen being blown in from adjacent fields. *From authors' summary.*

268. *Pastured Forests. Grazing on Forest and Open Ranges. Forage Plants etc.*

1221. Rai, L. **Management and improvement of forest grazing in the Madhya Pradesh.** *Indian For.* 78 (9), 1952 (431–9). (8th Silvicultural Conference, 1951.)

27. Arboreta. Arboriculture for Ornamental Purposes. Hedges and Hedge Plants

See also Nos. 1217–9, 1286.

1222. Areses Vidal, R. Algunas plantas de adorno o utilidad, como complemento de las repoblaciones en Galicia. [**Some ornamental or useful plants to supplement reforestation in Galicia.**] II Congreso Nacional de Ingeniería, Instituto de Ingenieros Civiles de España, Madrid 1950, Vol. IV, 1951 (171–217). [Span.]

Notes on 70 species—nomenclature, history of introduction into Europe, and uses, with brief bibliographies. A list of the species classified according to their uses is appended.

28. Husbandry of Forest Products other than Wood

See also section 89.

282. *Bark Crops*

See also Nos. 1199, 1750.

1223. Rubio Mazón, J. M. Restauración y repoblación con *Acacia mollissima* de la comarca de Ramailia en Marruecos Español. [**Rehabilitation and reforestation in the Ramailia region (Spanish Morocco) with *A. mollissima*.**] II Congreso Nacional de Ingeniería, Instituto de Ingenieros Civiles de España, Madrid 1950, Vol. IV, 1951 (219–36 + 1 map). [Span.]

Describes the natural vegetation, soil and climate of this region, and the silvicultural characters of *A. mollissima*, a species eminently suitable for reforestation in these parts. In 1948 direct-sowing and planting trials were undertaken. Ball-planting proved the best method, but was not generally adopted because of its high cost. Good results were obtained with direct sowing on ploughed soil. Pretreated seed was sown 4 cm. deep and the seedlings thinned to groups of 5 or 6. Weeding is very important in this region. The management of *A. mollissima* stands for tanbark production is discussed, and some data on Spanish imports of tanstuffs and pitprops are presented.

283. *Fruit and Seed Crops*

See also No. 1215.

1224. Zerbas, P. Ta charoupia, ho pro-hypologismos kai hē glyka tōn eispraxeōn. [**Carob beans, estimate [of productivity] and value of harvest.**] *Dasos* No. 6/7, 1948 (45–7). [Gk.]

Recalls a Government conference in 1932, following a businessman's request for permission to refine Carob sugar, at which an account was given of the Carob's distribution in Crete and on the Greek mainland. A survey showed an annual production of ca. 15 million okes [1 oke = 2·8 lb.], nearly all from privately owned trees. Recommendations to propagate the Carob in the dry areas of S. Greece, combined with control of grazing, came to little.

1225. Bernardini, F. Castagneti da frutto. [**Chestnuts grown for fruit.**] *Monti e Boschi* 3 (9), 1952 (398–404). [It.]

Discusses the distribution in Italy of Chestnut stands managed (1) for fruit, (2) as coppice with

standards, and (3) as simple coppice, and recommends the conversion of much of (1) to (3).

284. *Crops Tapped for Exudations*

See also No. 992.

1226. RYBERG, M. E. **Better tools for gum production.** *J. For. Prod. Res. Soc.* 1 (1), 1951 (25–7). 7 refs. P.R.

Briefly reviews the history of improved tapping equipment in the U.S.A. and describes the latest polyethylene acid sprayer (illustrated), and field-test models of a squeeze hack (combined sprayer and hack—also illustrated) and combination puller-sprayer.

1227. STRANGE, J. D. **The spiral gutter rossing tool.** *Naval Stores Rev.* 62 (25), 1952 (12, 24).

The tool here described and illustrated is specially designed to perform all phases of the setting-up, for spiral gutters [cf. *For. Abstr.* 13 (No. 3013)] on virgin trees. It has 2 blades, (1) a straight one used to cut bushes, clear trails and cut a flat surface on the tree to hold the cup, and (2) a curved blade for smoothing and shaping the bark to take the curved gutter. The name of the manufacturer may be obtained from the Program Supervisor, U.S. Forest Service, Valdosta, Georgia.

287. *Bamboo and Cane Growing etc.*

1228. ONOFRY, A. El cultivo industrial de *Arundo donax* en Ramallo (Argentina). **[The industrial cultivation of *A. donax* in Ramallo (Argentina).]** *Rev. argent. Agron.* 19 (3), 1952 (133–9). [Span.] E.M.B.

A report on the cultivation of *Arundo donax* by the firm Fiplasta S.A.C.I. at Ramallo, Buenos Aires. The plantations were established to provide raw material for hardboard ('Chapadur') manufacture. *A. donax* is grown in strips 2 m. wide, alternating with uncultivated strips of the same width. This allows for mechanical harvesting. Spread of the rhizomes beyond the 2 m. strip is prevented by trenching. The strips run east to west. When the rhizomes on the south side are exhausted, they should be extracted and new rhizomes allowed to form on the north side of the strip. This should be done periodically, and is necessary every 5–8 years, according to the state of fertility of the ground. The soil needs thorough ploughing to a depth of 60 cm., and should have a high N content. In general, land suitable for maize cultivation is also suitable for *A. donax*. Spring frosts can be harmful, and also certain weeds, whose eradication is described. [Cf. *For. Abstr.* 13 (No. 1693).]

288. *Crops Grown for Animal Products*

See also No. 1128.

1229. BRODBECK, C. Bienenweide. **[Bee pastures.]** Benno Schwabe & Co., Verlag, Basel. 1950. pp. 55. [G.f.it.] (*Schriftenreihe 'Natur und Landschaft'* No. 1.]

With reference to Swiss conditions. Includes notes on trees and other forest vegetation useful as bee pasturage, and urges the extension of Swiss bee pastures by using suitable spp. in hedges, shelter-belts, road- and stream-side plantings etc.

1230. SANTA ROSA, J. **The Pereiro [*Aspidosperma pirifolium*] of the drought region of Brazil, and its wax.** *Proc. UNSCCUR, Lake Success, 1949* 5, 1951 (312–5). 10 refs.

Describes the tree and gives details of the composition and use of the wax produced from it by *Ceroplastes psidii*.

3. HARVESTING OF WOOD, LOGGING AND TRANSPORT. RATIONALIZATION OF WORK; WORK STUDIES. FOREST ENGINEERING

31. LOGGING AND TRANSPORT : GENERAL

See also Nos. 1466, 1474.

1231. NORDSTRÖM, T. Skogsavverkning i tropikerna. **[Logging in the tropics.]** *Pap. ja Puu* 34 (9), 1952 (352–6). [Sw.e.] P.R.

An account of methods and equipment in the Belgian Congo.

1232. TAMESIS, F. **Improvements in logging techniques.** *Proc. UNSCCUR, Lake Success, 1949* 5, 1951 (243–6). 25 refs. [University of the Philippines, Manila.]

Discusses the change-over to tractor logging and the increased use of portable sawmills, in the Philippines.

1233. DRAKE, G. L., SIMMONS, F. C., COLLETT, M. H., and MATSON, E. E. **Improvements in logging techniques in the United States.** *Proc. UNSCCUR, Lake Success, 1949* 5, 1951 (234–42).

Discusses developments in the North-East and Lake States, the Southern U.S.A., and the Pacific Northwest.

32. FELLING AND RELATED OPERATIONS

321. *Marking*

See also No. 1450.

1234. MORRISON, G. R. **Tree marking with a paint gun vs. a stamping axe.** *For. Chron.* 28 (3), 1952 (46–8).

Analysis of the two methods and comparison of costs lead to the conclusion that the use of paint is advantageous in dense stands, provided that the basic paint supply is near at hand. For scattered timber, axes are better.

323. *Felling and Subsequent Primary Conversion*

See also Nos. 937, 1242, 1336.

1235. VACHULA, P. Motorová píla MP–50 pri práci v lese. **[The MP-50 saw driven by an internal combustion engine, and its performance in the forest.]** *Pol'ana* 7 (11/12), 1951 (206–10). [Slovak.]

Illustrated description of a chain-saw designed and manufactured in Slovakia from November, 1950, and its use both in the forest and at log dumps.

1236. POND, T. M. **Report of the cutting tool committee.** *Pulp Paper Mag. Can.* 53 (11), 1952 (156, 158).

Gives figures from various companies in Eastern Canada and from a study in the eastern U.S.A. showing increased production and earnings obtained by use of a one-man power saw, and the hours of work done by men using power saws and buck saws. No evidence was obtained in the region to show that power saws had been responsible for starting fires.

35. RATIONALIZATION OF WORK. WORK STUDIES

See also Nos. 1206, 1236, 1243–5, 1336, 1562, 1840

1237. HELMERS, U., and BYRNÄS, I. Skogsodlingsarbete på ackord: ett led i försöken att lösa skogsodlingsfragan inom ett större norrländskt skogsföretag. **[Forest cultivation on piece-work rates: one aspect of the attempt to solve cultivation problems in a large Norrland forest undertaking.]** *Norrlands SkogsvFörb. Tidskr.* 1952 (1), (64–103). 5 refs. [Sw.]

Time studies were made by Mo och Domsjö AB on the various operations involved in preparing the ground, planting, and sowing, using different tools and on sites of varying difficulty. Results are shown in graphs and tables. On the basis of these investigations a graph is given showing piece-work rates per 1000 units of area or per 1000 plants for different lengths of working periods and for different day wages, assuming a piece-rate bonus of 25% of the day wage.

1238. **Piece work in reforestation: an experiment to solve the reforestation problem of a big timber company in northern Sweden.** *Pulp Paper Mag. Can.* 53 (11), 1952 (178, 180).

A summary of *Meddelanden, Föreningen Skogsarbetens och Kungl. Domänstyrelsens Arbetsstudieavdelning (S.D.A.)* No. 43. Cf. preceding abstract.

1239. KLEM, G. G. Noen norske erfaringer angående rasjonalisering av skogsarbeide. **[Norwegian experience in rationalizing forest work.]** *Svensk SkogsvFören. Tidskr.* 50 (3), 1952 (249–62). [Nor.]

Discusses recent studies on logging and logging tools [cf. *For. Abstr.* 13 (No. 3027)], transport costs by rail and lorry for different timber lengths, floating and sawing barked and unbarked timber [cf. *For. Abstr.* 13 (No. 2213)] and piece-work rates for planting.

1240. FUJIBAYASHI, M., HONDA, M., and TSUJI, M. **Tests on stump extraction of Hinoki [*Chamaecyparis obtusa*].** *Forest-Technical Series, Government Forest Experiment Station* [, *Meguro, Tokyo*] No. 8, 1951. From *Abstr.* in *Rec. Res. Fac. Agric. Univ. Tokyo* No. 1, 1950/51 (1952), (68–9). [E.]

A comparative field study was carried out from September to December, 1947, at Meguro, Tokyo, using (1) hand tools, (2) a machine driven by producer gas and (3) explosives. Results showing costs of equipment, stump diameters, time/stump, size of crew, and operating costs for the different methods are tabulated.

1241. ČERMÁK, K. Bezpečnost práce v lese. **[Safety of work in the forest.]** *Lesn. Práce* 31 (7), 1952 (316–21). [Cz.]

Presents tabulated and graphed results of a 3-year investigation on injuries in forestry work.

Age: The maximum incidence occurs at ca. 30 years, after which it decreases to reach at ca. 60 years less than half the maximum value, and then rises again. *Experience:* The incidence/number of years of work curve falls steeply and flattens out, injuries becoming very few after ca. 7 years of work. *Time of day:* The effect of fatigue is shown by a curve having 2 peaks, one at ca. 11 a.m., and the other at ca. 5 p.m. *Day of week:* The total number of injuries is highest on Tuesdays, and lowest on Saturdays, but fatal injuries are lowest on Tuesdays, and highest on Fridays. *Place of work:* 60% of injuries occur on the felling site, 16% in log dumps, 14% on roads, 2% on clearings, 1·5% in nurseries, the rest in other working places. *Species:* The most dangerous species are Spruce (lopping), Beech (splitting), then Fir, Oak, Pine, Larch, and the remaining Czechoslovak hardwoods, in that order. *Job:* Felling accounts for 42% of injuries, skidding for 12·5%, handling 12%, transport from the forest 10·5%, silvicultural work 10%, transit to and from work 6·5%, construction and maintenance, 5%, other work 1·5%. *Proximate agent:* Falling stems and branches caused 17·5% of all injuries; splinters and fragments, 7·2%; lopping axes, 12·1%. *Type of injury:* Head 12·3%, trunk 13·7%, upper limbs 27·7%, lower limbs 46·3%. *Degree of injury:* 67% light, 30% serious, 3% fatal.

1242. MAKKONEN, O. Halkojen ja polttorankojen teko. **[Making split firewood and firewood barked in strips.]** *Julk., Metsäteho, Helsinki* No. 28, 1952. pp. 27. 8 refs. [Fi.e.]

Studies were made in autumn and winter on the relative time needed to prepared 1-m. split firewood and 2-m. firewood barked in strips, both of Birch. Tables are given showing the time, expressed as a % of the total time at the working place, for each phase of the work (felling, trimming, cross-cutting, splitting or barking in strips, piling and interruptions) for the two methods, and the comparative total times. In autumn, if the time for splitting is taken as 100, that for barking ranges from 83 when the volume of the stem used, including bark, is 0·025 cu.m., to 67 for a volume of 0·275 cu.m. The corresponding range of times in winter for barked firewood is from 86 to 74. Wage tables, based on degree of difficulty, are given for the two methods. The legends to graphs and tables are in Finnish and English.

37. TRANSPORT

372/377. *Land Transport*

See also Nos. 936–8, 1239, 1272.

1243. GLÄSER, H. Das Rücken des Holzes: eine Übersicht über Hilfsmittel und Arbeitsverfahren zum Rücken von Stamm- und Schichtholz in den Wäldern. **[Timber extraction: a review of equipment and working methods for the extraction of timber logs and cordwood.]** Bayerischer Landwirtschaftsverlag, Munich. 1951. pp. 242 + 1 tbl. 246 refs. [G.] Price [11*s.* 2*d.*]

A comprehensive review with chief reference to Central European conditions and including data, where available, on performance and costs/working hour. The subject matter is arranged as follows: (1) *General considerations* (preparations, planning, skidding damage etc.). (2) *Extraction of long timber*: (*a*) Frictional resistance and means of overcoming it. (*b*) Use of manual methods and gravity. (*c*) Use of animals (performance and care of animals; dragging; use of 2-wheeled carriages). (*d*) Use of tractors (tractor types and performance, fuel, tyres, accessory equipment; dragging; use of wheels and arches, trailers, straddle trucks). (*e*) Use of winches and cable systems (winch types; dragging by winch; overhead cable systems). (3) *Extraction of cordwood:* (*a*) Use of manual methods and gravity. (*b*) Use of animals. (*c*) Use of tractors. (*d*) Use of cable systems. (4) Performance (working times) and wages. (5) Comparative appraisal of different extraction methods.

An appendix contains notes on cables and their care, and a specification of the Sauerländer Rückekarre—a wheelbarrow for cordwood. Manufacturers or suppliers of equipment are listed and there is a subject index.

1244. GLÄSER, H. Arbeitsverbilligung beim Motorsägeeinsatz im Hauungsbetrieb durch Lang- und Baumholzrücken. **[Reducing labour costs in power-saw logging by skidding [roughly trimmed] long timber and whole trees.]** *Forstarchiv* 21 (10/12), 1950 (135–41). 8 refs. [G.g.]

Gives the results of time studies in Beech forests in Hesse to demonstrate the advantages of skidding tree-length material, with minimum trimming at the felling site, to points where cross-cutting by power saw can be centralized.

1245. UNTERBERGER, W. Arbeitsstudien beim Rücken von Fichtenderbstangen. **[Work studies on the [manual] extraction of Spruce poles 7–14 cm. in diameter at 1 m. from the butt end.]** *Forstarchiv* 22 (9/10), 1951 (140–3). [G.g.]

A comparative time study of two methods: (1) carrying on the shoulder, and (2) dragging by chain (the 'Rinkeroder Waldkette'). Times for (1) and (2) did not differ, but (2) is the more economical of energy: it enables fairly light poles to be dragged two at a time, whereas two poles can be shouldered only for short distances; if the poles are heavy, it avoids the strenuous effort needed to lift them on to the shoulder.

1246. HEYDEN, D. Ein neues Universal-Transportgerät. **[A new multi-purpose barrow.]** *Forst u. Holz* 7 (17), 1952 (237). [G.]

Describes briefly a convertible, steel-tubing wheelbarrow, which can be adapted in various ways. For example, the metal container is removable, allowing the barrow to carry either loose material or short lengths of log or firewood. Runners can be fitted for movement over snow, and the axle of the wheel can be shifted backwards or forwards according to the load.

1247. COLLARDET, J. **Log transportation.** *Proc. UNSCCUR, Lake Success, 1949* 5, 1951 (249–53). [École Supérieure du Bois, Paris.]

Discusses the technical problems, particularly those in tropical forests, with particulars of some suitable equipment.

1248. Pepler, W. A. E. **Extraction—logging and its effects on forest practice [in Eastern Canada].** [Canadian Pulp and Paper Association, Montreal?] 1952. pp. 11. (6th British Commonwealth Forestry Conference, Canada, 1952.)

Discusses effects of mechanized logging (e.g. on forest floor and residual stand) and their possible bearing on forest management practice in the future.

1249. Simonović, M. Neke nepravilnosti kod građenja visećih žičara u svetlosti teorije. [**Some faults in the construction of overhead cableways from the theoretical point of view.**] *Šumarstvo* 5 (2), 1952 (97–110). 4 refs. [Serb.serb.f.]

The method of securely fixing both ends of the load-carrying cable ('tolminka' type) is compared with the method, used only in one place in Slovenia, of fixing only one end while the other is tautened by a weight. The great amplitudes of annual temperature in Slovenia (and in Jugoslavia in general) have an effect on the tension of the cable. Mathematical analysis of stresses occurring when a load is moving along the cable, leads to an equation for the determination of total stress in a cable fixed at both ends; the coefficient of safety in this case should be 2–2·5. It is found that, when a cable so fixed is subjected to a greater stress, the elasticity limit may be exceeded, and the cable suffer permanent deformation. Both the temperature effect and the high stresses due to the method of suspension from fixed ends are claimed to be avoidable if one end of the cable is tautened by a weight.

1250. Hias, G. L'art du cabliste forestier. [**The skill of the working forester in installing cableways.**] *Rev. for. franç.* 1952 (10), (759–72). 5 refs. [F.]

Discusses in detail the methods of forest workmen in installing cableways, compares their methods with those of the orthodox engineer, and emphasizes their frequent superiority, particularly in laying out the course of the cableway.

1251. Lloyd, A. H. **A new mechanized portable cableway for getting timber from difficult sites.** *Aust. Timb. J.* 18 (6), 1952 (428, 430).

Describes the Wyssen Skyline Crane. [Cf. *For. Abstr.* 14 (pp. 7–8).]

1252. Dobromyslov, B. Spusk drevesiny s gor lebedkoĭ TL-3. [**Lowering timber from mountains by means of a TL-3 winch.**] *Lesn. Prom.* 11 (2), 1951 (16–8). [Russ.]

Describes and illustrates an 'endless' monocable skidding system, used in the E. Carpathians. This has a circuit of ca. 2000 m. and a capacity of 90–100 cu.m. timber per shift on a 900 m. haul. Auxiliary drums on the winch facilitate yarding at the dump.

1253. Čugunov, I. N., and Voroncov, P. S. Avtomobiljnaja vyvozka lesa v hlystah v Kiljmezskom lespromhoze. [**Lorry haulage of tree-length logs in the Kil'mez Lespromkhoz.**] *Lesn. Prom.* 11 (1), 1951 (13–4). [Russ.]

Gives provisional results of the adaptation of a ZIS-21 lorry with a tyred trailer to hauling tree-length logs. During the first days of work, the average load was ca. 6·75 cu.m. per lorry, and the time required for loading, hauling for a distance of 6·4 km. and returning, was ca. 87 min. Later the load was increased to ca. 8 cu.m., the output per lorry-shift varying from 30 to 35 cu.m. when the hauling distance was 8 km. Still later, the load was increased up to 10 cu.m. (with a trailer on runners), when the output per lorry-shift rose to 45–50 cu.m., the distance being ca. 8·5 km.

1254. McNally, J. A. **A log transportation project in Eastern Canada.** *Proc. UNSCCUR, Lake Success, 1949* 5, 1951 (260–3).

Describes a 16-mile winter haul of 13-ft. logs by lorry and semi-trailer. The logs were loaded with Drott skid-loaders and hauled by Diamond T lorry having home-designed and home-made all-steel semi-trailers built to carry 25-ton loads at an average speed of 16 m.p.h.

1255. Mégille, X. de. Les différentes méthodes d'accrochage des grumes aux engins de traction. [**Different methods of hitching logs to tractors, logging arches etc.**] *Bois For. Trop.* No. 20, 1951 (239–250). [F.e.span.]

After reviewing various methods, the author discusses in detail the use of chokers, now general in the U.S.A. and the possibility of their use in France and the tropics.

1256. Pimšteĭn, A. S., and Koljadin, B. I. Avtokran kareljskogo tipa na uzkokoleĭnoĭ platforme. [**Lorry-crane of the Karelian type on a narrow-gauge railway flat.**] *Lesn. Prom.* 11 (3), 1951 (8–9). [Russ.]

Describes gangways arranged on flats, and transportable gangways, enabling the lorry-crane to move from one flat to another and so load the whole train.

1257. Jakušev, V. V. Pogruzka lesa trelevočnoĭ lebedkoĭ na verhnem sklade. [**Loading of timber at the forest log dump by means of a skidding winch.**] *Lesn. Prom.* 11 (2), 1951 (14–5). [Russ.]

Describes and illustrates experiments on the application of the subsidiary drum of the TL-3 winch for loading timber on to a forest railway. A stationary inclined jib was made from seasoned Spruce logs, and the loading effected by means of a traction cable and pulleys.

1258. Parfenov, G. M. Električeskie lebedki na skladskih rabotah. [**Electric winches for depot work.**] *Lesn. Prom.* 11 (2), 1951 (11–3). [Russ.]

An illustrated description of the following uses of TL-1 and TL-3 winches: (1) loading of timber on to railway trucks, (2) conveying logs from water to the sleeper sawmill, and (3) conveying sawdust away from the mill.

1259. **Timber haulage: new logging arch and trailers seen at Commercial motor show [at Earls Court, London.]** *Timb. Tr. J.* 202 (3969), 1952 (114–5).

1260. Štajduhar, F.; Gabričević, A. Koristimo se domaćim mehaničkim sredstvima za privlačenje drveta. [**Let us use home-made mechanical means for timber haulage.**] 'Kovačić kola'—jedno korisno ali malo poznato sredstvo za racionalizaciju izvoza oblovine. [**The Kovačić sulky—a useful but little known means for the rationalization of log transport.**]

Drvna Industrija, Zagreb 1 (1), 1950 (16–8); 2 (11/12), 1951 (10–3). [Croat.]

An illustrated description of a 2-wheel sulky designed by the brothers Kovačić (Croatia). Two wheels of ca. 2 m. diameter are connected by a heavy (40 kg.) axle which carries a hand-operated winch with tongs. Two parallel shafts are mounted above the axle, extending 1·30 m. behind the wheels, and 5 m. in front of them. Two transverse boards can be fixed at any height transversely below the shafts on either side of, and at equal distance from, the axle. The sulky is driven up to and over the log which is then lifted by means of the winch-tong device. The transverse boards are then fixed under the log. In unloading the operations are reversed. It is claimed that with an average load of ca. 1 cu.m. of timber, the sulky with 1 horse can transport in 8 hours 175 loads to a distance of 30 m., 55 loads to a distance of 200 m., or 26 loads to a distance of 550 m.

1261. Fujibayashi, M., Honda, M., and Yamawaki, S. **Some experiments on a tractor and sleds for hauling logs on snow.** *Rep. For. Exp. Sta. Meguro, Tokyo* 60, 1951 (17–29). From *abstr.* in *Rec. Res. Fac. Agric. Univ. Tokyo* No. 1, 1950/51 (1952), (68). [E.]

Results of field experiments made in January 1950 at the Hetonaizawa National Forest in Akita prefecture are reported. Mitsubishi Type-25 three-ton crawler tractors and ordinary wooden sledges were used for the experiments. Starting resistance (static friction) and running resistance (moving friction) were measured for various conditions of snow roads, log-carrying sled runners, loads and buffer devices. The coefficients of resistance were calculated and numerical values analysed. From these some principles governing the motion of a train of sledges pulled by a tractor and a load table for practical use were obtained. [Cf. *For. Abstr.* 13 (No. 3039).]

1262. Abolj, I. P. Tjagovye kačestva traktora KT-12 na snežnyh volokah. **[Tractive qualities of the KT-12 tractor on snow trails.]** *Lesn. Prom.* 11 (1), 1951 (7–8). [Russ.]

Presents results of a study made to establish the characteristics required of this tractor when skidding logs on snow-covered roads. The co-ordinate of the 'centre of pressure' (distance between the projections on the track of the centre of gravity and of the axle of the front sprockets) depends upon the load. The mean value of the specific static pressure of the crawler track on the ground is: for an empty tractor, 0·49 kg./ sq. cm., and for a fully loaded one, 0·62 kg./sq. cm. These specific pressures are evenly distributed along the crawler track if the pull of the load cable of the tractor in motion is 350 kg. For larger or smaller values of the tractive force, the mean specific pressure under the front rollers is respectively greater or smaller than that under the rear ones. The average value of the coefficient of resistance to rolling (tractive force required to move the tractor on a horizontal track, divided by its weight) for a horizontal, straight, and hard-packed snow trail, is 0·09 (from 0·06–0·12). For a road covered with a layer of loose snow at least 40 cm. thick, the coefficient rises to 0·17. These figures refer to first-gear driving, and become greater for second-gear. The average starting tractive force is 26–36% greater than that required to continue traction.

1263. Sundberg, U. Något om hjul- och bandtraktorer för virkestransporter vintertid. **[Wheeled and caterpillar tractors for wood transport during winter.]** *Norrlands SkogsvFörb. Tidskr.* 1952 (2), (281–6). [Sw.] (*Meddelanden från Föreningen Skogsarbetens och Kungl. Domänstyrelsens Arbetsstudieavdelning* (*SDA*) No. 47.)

Discusses permissible loads in winter conditions.

1264. Beély, M. Jednokol'ajnicové prenosné zariadenie na sbližovanie. **[One-rail device for timber extraction.]** *Pol'ana* 7 (11/12), 1951 (223). [Slovak.]

A translation from the Hungarian [*Erdögazdaság* 5 (No. 19), (14)]. The single rail (narrow-gauge weight) is mounted on wooden tripods and the carriage (one container on each side) is attached to a frame embodying two grooved runner wheels. The centre of gravity of the carriage is well below the rail, while the shape of the containers prevents their fouling the tripods. The maximum load is 400 kg. Brakes are provided on the rail, and a long side-handle attached to the frame provides manual control. It is claimed that this device, which can even carry sleepers, may be used for slopes up to 30%.

378. *Water Transport*

See also No. 1239.

1265. Abrarov, I. Š., and Osipov, M. E. Splotka lesa lebedkami TL-3 na reïdah Kamlesosplava. **[Raft-building by means of TL-3 winches in the Kamlesosplav rafting depots.]** *Lesn. Prom.* 11 (2), 1951 (20–2). [Russ.]

Illustrated description of experiments on the use of TL-3 winches for raft-building, as compared with the usual machines e.g. the VKF-16. The winches have shown quite high efficiency, are simple to maintain, and can be recommended for small rafting depots and for rafting in early spring.

1266. Singalevič, M. S. Uzkokoleïnaja lebedočnaja ustanovka na zimneï splotke. **[Winch set-up on narrow-gauge railway [flats] for winter raft-building.]** *Lesn. Prom.* 11 (1), 1951 (28–9). [Russ.]

Illustrated description of the method of arranging TL-3 winches on narrow-gauge railway flat cars.

1267. Žukov, G. A. Splotka i buksirovka morskih plotov. **[Construction and towing of sea-going rafts.]** *Lesn. Prom.* 11 (3), 1951 (12–5). [Russ.]

Large quantities of timber were towed in the White Sea during the five-year plans, using the cigar-shaped 'Onega' rafts, 120 m. long, 4–6 m. high, and 13–14 m. wide amidships; they were towed by special tugs of 1000–1200 h.p., the load being 4–5 cu.m./h.p. In the Baltic, the first sea-going rafts were tried in 1930, and in the Caspian, in 1931. Cigar-shaped rafts were introduced on Lake Baikal in 1938, while sea-going raft transport in the Far East (Kamchatka, Sakhalin) started in 1934–7. In the Black Sea two kinds of rafts are used: (1) large

cigar-shaped rafts, 100 m. long, 12 m. wide amidships, and 7·2 m. high, volume 3500 cu.m., and (2) small rafts, 72 m. long, 12 m. wide, 6 m. high, volume 2000 cu.m. [cf. *For. Abstr.* 11 (No. 2882)]. Details of dimensions, volume, and rigging of 7 types of 'cigar' rafts used in different Soviet seas are tabulated. The following dimensional ratios are recommended by the author as confirmed by practice: L (length)/B (max. width) = 7–8/1; L/H (height) = 16–17/1; L/ (B + H) = 5–6/1; and B/H = 2–2·3/1. The author analyses the stresses to which sea-going cigar-shaped rafts are subjected, and finds that the official (CNII) formula for the evaluation of longitudinal stresses yields far too low values.

1268. Bereznoĭ, T. Novyĭ sposob ukladki breven v morskie ploty. [**A new method of log-packing in sea-going rafts.**] *Lesn. Prom.* 11 (3), 1951 (15). [Russ.]

Recommends the method, used in the Caspian since 1949, of packing the logs in staggered fashion, like the courses in brickwork. For economy, however, only the top 2 and bottom 2 courses or layers should be staggered both lengthways and sideways (necessitating manual work), and the interior logs only as between layers and not laterally in any one layer, so that they can still be packed mechanically. The strength of such rafts has not been found inferior to that of through-and-through staggered rafts.

1269. Callin, G. Några synpunkter på tallvirkets flytbarhet. [**Some aspects of the floating properties of Pine wood.**] *Norrlands SkogsvFörb. Tidskr.* 1952 (1), (117–39). [Sw.sw.] (*Medd. SkogsforsknInst., Stockh., Ser. Uppsatser* No. 24.)

A study of floating properties was made on about 100 unbarked and 50 patch-barked logs in each of the different districts of North Sweden. The density of the logs was determined by various methods: (1) from the relationship between the part of the log diameter above water and the total diameter; (2) from the additional weight needed to immerse the log; and (3) from the weight of the log after removal from the water. A wide variation was found for individual logs with all three methods, but the average result for (2) and (3) was roughly the same, and that for (1) rather higher. A straight-line relationship existed between heartwood % and density, but the scatter was too great for any precise determination of the heartwood % at which barking, as an insurance against sinking, could be dispensed with. There was a tendency towards higher density in butt logs than in middle and top logs with the same heartwood % and the same drying period. Density after a period of forest storage was higher for smaller heartwood content and knot area, and for greater bark thickness and log diameter. The degree of drying in the first month after felling was greatest with completely barked and least with unbarked logs, and, irrespective of the degree of barking, was least in butt and greatest in top logs. No significant difference could be determined between unbarked and partly barked logs, nor between butt, middle and top logs of these two categories, in the amount of water taken up during 3½ months' floating, but top logs of completely barked timber showed a significantly larger uptake of water than butt logs. Density at time of felling was found to have a direct effect on floating, and the proportion of logs above the maximum weight for floating (950 kg./cu.m.) was highest among butt logs. For whole logs, no significant relationship between latewood % and floating properties could be found, but for increment cores, in which the latewood % was measured microscopically, the period of floating increased significantly with decreasing latewood %; this relationship could not, however, be established when latewood % was judged by eye. A significant relationship was also found between the air-dry-weight/green-volume ratio of the core and floating time. There was a tendency to increasing floating time with increasing annual ring breadth. When cores were taken from above- and below-water positions in the log and at water level there was very little difference in the number of cores in the highest density classes (1000 kg./cu.m.) with position. The uptake of water was least in cores from the top end of the logs, increasing to a maximum towards the middle and decreasing somewhat towards the butt. A larger part of the outer sapwood came in the higher density classes in butt logs than in middle and top logs. The density of logs put into the water in May increased rapidly during the first fortnight, remained constant during the summer and increased again during the autumn. The density of logs put in the water in October remained constant during the winter and summer and increased during the autumn. Considerable variation was found between the logs in their change of position during the floating period.

1270. Masani, N. J. **Forest booms.** *Indian For.* 78 (10), 1952 (514–31 + 7 photos).

Describes in detail the construction of a typical, temporary wooden boom, such as is generally used in timber-floating operations in India.

1271. Collier, R. D. **The measurement of forces acting on the Outardes pulpwood booming system.** *Pulp Paper Mag. Can.* 53 (9), 1952 (120 . . . 128). (*Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 1268 (*B–9–G*).)

Describes the use of electric strain-gauges in measuring the loads on this system (Quebec North Shore Paper Company) in the spring of 1951.

38. FOREST ENGINEERING

See also No. 1832.

381. *Materials (including Explosives and their Use)*

See Nos. 1171, 1274.

383. *Roads and Bridges*

1272. Putkisto, K. Moottoritalviteiden rakennus ja hoito. [**Construction and care of winter motor roads.**] *Metsätehon Oppaita*, Etelä-Esplanaadikatu 2, Helsinki. 1952. pp. 138. 59 refs. [Fi.]

A handbook dealing with practical aspects, including different types of road (earth, snow, ice) for wheeled or track vehicles, manual and mechanical construction and maintenance, tools and apparatus, and estimates of man-hours for various work.

384. *Protective Works*

See also Nos. 961–2, 1178–9.

1273. Lawinenverbau. **[Protective works against avalanches.]** *Beih. Z. schweiz. Forstver.* No. 26, 1951. pp. 93. 18 + 6 refs. [G.f.]

A collection of papers written for a tour of study arranged by the Swiss Federal Inspectorate of Forests, 11–16 September 1949, containing the following: Protective works against avalanches in the light of practice and research (*A. J. Schlatter*); Fundamentals of protective works against avalanches (*E. Bucher*); Recent trends and problems of protective works in the areas where avalanches originate (*R. Haefeli*); Principles and preparatory work in the planning of protective works (*H. R. In der Gand*); and Types of construction for protective works (*H. R. In der Gand* and *R. Figilister*).

385. *Drainage, Irrigation, Sedimentation. Water Supply*

See also No. 1197.

1274. Lindberg, K. Dikessprängning med nitrolit. **[Blasting drains with Nitrolite.]** *Skogen* 39 (5), 1952 (119–20). [Sw.]

Preliminary experiments were made to compare the cost of using special dynamite touched off by detonating waves in charge holes 17–33 cm. apart, and Nitrolite [a safe explosive made by Nitroglycerin Aktiebolaget, Sweden] in charge holes 75–100 cm. apart but with a separate detonator (generally electric) in each hole. Results suggest that the Nitrolite method is cheaper, and also more dependable, for dry soils, and the special dynamite on soils moist enough for charge holes to be reasonably far apart. There seems little difference in labour costs. Nitrolite is cheaper than the special dynamite, but the cost of the extra detonators is high. The value of the Nitrolite method is that work can continue when soils become too dry for the other. [Cf. *For. Abstr.* 13 (No. 2219).]

386. *Waterways. Stream Training*

See Nos. 959–62, 1178–9.

1275. KLEMM, M. [Editor]. Das Auftreten der wichtigsten Krankheiten und Schädlinge der Kulturpflanzen im Jahre 1950 im Bereich der Deutschen Demokratischen Republik. **[The occurrence of the most important crop diseases and pests in eastern Germany during 1950.]** *NachrBl. dtsch. PflSchDienst.* 6 (Spec. No.), 1952 (1–40). [G.]

Notes (with maps) on the occurrence of outbreaks, including forest pests and diseases.

1276. PEACE, T. R. **The control of forest diseases and insect pests in Great Britain.** *Proc. UNSCCUR, Lake Success, 1949* 5, 1951 (60–2).

1277. CRAIGHEAD, F. C., and HUTCHINS, L. M. **The control of insects and diseases in North American forests.** *Proc. UNSCCUR, Lake Success, 1949* 5, 1951 (55–7). [Bureau of Entomology and Plant Quarantine, U.S. Department of Agriculture.]

41. GENERAL TECHNIQUE OF FOREST PROTECTION. TYPES OF INJURY

411. *Natural and Biological Control*

See Nos. 964–6, 1331, 1341, 1348, 1354, 1361–2, 1379.

414. *Chemical Control*

See also Nos. 938, 1376.

1278. HIERHOLZER, O., and KLAUSER, O. Düsenstudien als Beitrag zur Steigerung der Wirtschaftlichkeit chemischer Bekämpfungsmethoden im Walde. **[Spray-nozzle studies to increase the economy of chemical control methods in the forest.]** *Allg. Forst- u. Jagdztg.* 123 (2), 1951 (49–53). 2 refs. [G.]

Gives some account of the performance of two German nozzle types for knapsack sprayers—the usual *Plättchendüse* and the new *WSW-Scherenschleierdüse* (both illustrated by sectional diagrams)—in tests of spray consumption and distribution of droplets in the cone of spray produced (using plain water, an emulsion, or a suspension) and spray losses (spray not retained on the treated plant). Emphasizes the need for adjusting the balance between the conflicting requirements of fine spray distribution, economy in spray materials, and rapid delivery (economy in working time), to the job in hand. The *WSW-Scherenschleierdüse*, while superior to the *Plättchendüse* in accuracy, fine distribution and economy of spray, achieves this at the cost of a lower delivery rate and is likely to be unsuitable for jobs demanding a high dosage of chemical per unit treated (e.g. treating stumps, trap logs etc.), but more suitable for spraying 3- to 4-year-old Spruce against *Hylobius abietis*—for which it was designed in the first place—and similar tasks.

42. INJURIES FROM INORGANIC AGENCIES OTHER THAN FIRE

421. *Air Currents*

See also No. 1325.

1279. MERGEN, F., and WINER, H. I. **Compression failures in the boles of living conifers.** *J. For.* 50 (9), 1952 (677–9). 7 refs.

Compression failures in living trees can occur without complete breakage of the stem, provided the force imposed by snow loads or wind is great enough to cause the leeward side of the bole to fail in compression, but not sufficient to cause tension failure on the windward side. Several European foresters have reported this phenomenon in stands of pole-size conifers. This paper reports similar injuries to Eastern White Pine, Red Pine, and Norway Spruce in New Hampshire and Connecticut.

A zone of compression wood, marked by diagnostic ridges or swellings, usually develops on the injured side of the stem. This process tends to restore the original strength of the stem, but it also increases the cull volume in sawtimber. Moreover, injured trees are susceptible to breakage during later storms. Whenever possible, such trees should be recognized and removed from the stand in salvage cuttings and other operations. *Authors' summary.*

1280. ENGELHARDT, N. T. **Deterioration of White Spruce and Alpine Fir.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 8 (4), 1952 (3).

A study was made of fallen trees in an area of *Picea glauca/Abies lasiocarpa* forest in British Columbia that suffered extensive windthrow in a storm in 1948. Two years after, average radial penetration of decay was 0·4 in. for each species; in the following year it was 0·95 in. for the Spruce and 0·5 in. for the Fir. The principal decay fungi, in order of their importance and degree of penetration were *Stereum sanguinolentum* (also responsible for a major heart rot of living Spruce and Fir in this region), *Polyporus abietinus*, and *Fomes pinicola.*

422. *Temperature Influences. Frost. Heat. Drought*

See also No. 1373.

1281. WYSONG, N. **Chinese Elm damage.** *Amer. Nurserym.* 96 (6), 1952 (16).

Examination of a number of dead and dying trees of *Ulmus parvifolia* in Chicago streets, showed extensive bark necrosis at the base of the affected trees. The injury is believed to be due to sudden severe frost in November following an unseasonably warm autumn.

1282. IS[H]IDA, S. **A study on frost crack in trees.** *Low Temperature Science, Hokkaido* No. 5, 1950 (61–73). [Jap.e.] L.S.

Frost cracks were examined on a number of trees from a forest in Hokkaido. It was found that softwood species were liable to crack when they had wet wood in the interior of the trunk and hardwoods when there were many internal cracks packed with ice in the trunk. Measurements were made on a large number of discs cut from cracked trunks; it was found that the width of the crack at the outer edge of the disc varied in proportion to the area of wet wood in conifers or to the total area of internal cracks filled with ice in hardwoods. A log of *Abies mayriana* was cut from a trunk that had cracked during the winter, and after the crack had closed in the following summer it was put in a temperature of − 20° C. The sapwood froze first and then the wet

wood in the inner part of the log. The crack remained closed during the freezing of the sapwood and opened when the wet wood began to freeze. *From author's summary.*

1283. ISHIDA, S. **The occurrence of frost crack in forest trees in Hokkaido.** *Res. Bull. exp. For. Hokkaido Univ.* 15 (2), 1952 (303–41). 9 refs. [Jap.e.]

Observations were made on all trees over 10 cm. d.b.h. in 12 stands of mixed forest. A total of about 500 frost cracks was found. These were most frequent in *Abies mayriana*, 15% of which showed injury. The base of the frost crack may be from 0 to 10 m. above the ground and the top from 0·5 to 13 m. The part of the stem between 1·0 and 2·5 m. is most frequently injured. The length of the crack varies between 0·5 and 10 m., averaging 1 m. *From author's summary.*

1284. SIBILIA, C. Conseguenze della persistente siccità dell' ultimo decennio sui nostri boschi. [**The effect on our forests of the persistent drought of the last decade.**] *Ital. for. mont.* 7 (4), 1952 (161–7). [It.f.]

Summarizes the direct and indirect injury suffered by the principal forest tree species in Italy.

1285. IRMAK, A. Türkiyede kuraklık meselesi ve kurak sahalarımızda yapılması gereken toprak araştırmaları. [**The drought problem in Turkey and the soil investigations necessary in dry areas.**] *Istanbul Üniv. Orm. Fak. Derg.* 1*B* (2), 1951 (3–7). 13 refs. [Turk.]

A brief review, with general recommendations for a first attack on the problem.

423. *Precipitations*

See No. 1279.

424. *Soil Conditions. Erosion Effects*

1286. WYSONG, N. **Salting icy pavement may affect trees.** *Amer. Nurserym.* 96 (8), 1952 (30–1).

Cites some cases of injury to trees through accidental application of common salt in the soil, and points out the possible danger to street trees of the custom of applying large quantities of salt to pavements, to keep them free of ice and snow.

43. FOREST FIRES

See also No. 1372.

432. *Prevention and Control*

See also Nos. 936, 1130.

1287. BEALL, H. W. **Some modern aspects of forest fire control in Canada.** *Proc. UNSCCUR, Lake Success, 1949* 5, 1951 (40–3). 9 refs.

1288. MACKEY, T. E. **Forest fire protection in Ontario.** Ontario Department of Lands and Forests, Toronto. 1952. pp. 19. (6th British Commonwealth Forestry Conference, Canada, 1952.)

1289. BROWN, A. A. **Forest fire control [in the U.S.A.]** *Proc. UNSCCUR, Lake Success, 1949* 5, 1951 (34–40). 45 refs.

1290. **Report on forest fire protection in New South Wales during the 1951-52 fire season.** Government Printer, Sydney. 1952. pp. 16 + map.

1291. TORBET, E. R. **Fire protection in Victoria, Australia.** Forests Commission of Victoria. 1952. pp. 15. (6th British Commonwealth Forestry Conference, Canada, 1952.)

1292. Étude des coupe-feu. [**A study of permanent living fire-breaks.**] *Rapp. Inst. nat. Étude agron. Congo belge 1951*, 1952 (58). [F.]

Trial plantings have been made of wide hedges of *Sweetia brachystachya*, a South American leguminous species with very dense foliage. Four methods of establishment are being tested over a length of 1140 m.: (1) planting of stumps with a length of 1 m. above the collar, in standard planting holes (20 × 20 × 20 cm.) with (*a*) puddling (*pralinage*) of the roots, (*b*) puddling of the whole plant; (2) planting of stumps with a length of 0·5 m. above the collar, in standard planting holes, with puddling of roots; (3) spot sowing in prepared holes; and (4) spot sowing without soil preparation.

1293. ILCH, D. M. **Some limitations on the use of succulents for erosion control.** *J. Soil Wat. Conserv.* 7 (4), 1952 (174–6, 196). 3 refs.

Experiments were made in the use of a number of species of succulents for controlling erosion on permanent cleared firebreaks in Californian forests. The results indicate that one species, *Mesembryanthemum croceum*, and probably three others, *M. edule*, *M. roseum* and *M. tenuifolium*, have some merit for this purpose if the following conditions are observed: use to be limited to areas where temperatures lower than 25° F. are rarely experienced, and to elevations not in excess of 3500 ft.; mass planting to be used in order to minimize deer and rabbit damage and competition from grass and annual weeds; and planting to be limited to slopes of 45% gradient or less—succulents may form a dense trailing cover on steep slopes, yet be inadequate for soil stabilization because of insufficient root development.

1294. FRASER, D. G. **Polarizing screens and range-finders as aids in forest fire detection.** *Fire Res. Leafl. For. Br. Can.* No. 7, 1952. pp. 4. 1 ref.

1295. Het blussen van bos en heidebranden. [**Extinguishing forest and heath fires.**] *Vlugschrift Staatsbosbeheer, Utrecht* [1951?]. pp. 11. [Du.]

1296. WICKLUND, H. T. **Rotor type fire line trencher.** *E.D. Rep. U.S. For. Serv.* No. 17, 1952. pp. 12.

A history of the development of the trencher, with an illustrated description. In open country with light duff the trencher averages 40 chains of trench per hour; in heavy duff, roots or brush, about 20 chains. The single (rotor hammer) head gives a trench 12 in. wide, and the dual head a trench 20–24 in. wide. The petrol tank, holding 1 gal., will last 5½ hr. at full throttle. The whole machine, full of petrol and oil, weighs 265 lb. One of the more outstanding features is a levelling device that raises or lowers the wheels so that the machine can sit level on a 60° side slope.

436. *Beneficial Effects of Fire. Uses of Fire in Silviculture and Other Forms of Husbandry*

See also Nos. 1108, 1165–6.

1297. WEAVER, H. **A preliminary report on prescribed burning in virgin Ponderosa Pine.** *J. For.* 50 (9), 1952 (662–7). 4 refs.

Prescribed burning in virgin Ponderosa Pine stands of the Fort Apache Reserve reduced fire hazard to negligible proportions. No harmful results (e.g. accelerated erosion) have been observed.

1298. SILEN, R. R. **Timing of slash burning with the seed crop—a case history.** *Res. Notes Pacif. Nthwest. For. Range Exp. Sta.* No. 81, 1952. pp. 2. 1 ref.

Seedling counts were made in June, 1952, on milliacre quadrats in Douglas Fir in the Blue River Experimental Forest. About the same number of seedlings was found on unburned surfaces and on one area burned in mid-Aug., 1951, before seedfall, but only half as many on an area where slash was burned in October after at least half the seed had fallen.

1299. Influence des feux de brousse sur la régénération des coupes. **[The influence of prescribed burning on the regeneration of cut-over areas.]** *Rapp. Inst. nat. Étude agron. Congo belge 1951*, 1952 (46–7). [F.]

Experimental plots were (1) protected from fire, (2) early-burned, (3) late-burned. The advantages of early burning were obvious, not only by preventing destructive accidental fires but also by favouring the light-demanding species that compose the open climax forest of Katanga, and suppressing the weaker regeneration in favour of the more vigorous.

44. DAMAGE BY HARMFUL PLANTS. VIRUS DISEASES

441. *Weeds*

See also Nos. 936–8, 1153–4, 1207–10.

1300. LING, L. **Weed control by growth-regulating substances.** *FAO agric. Stud.* No. 13, 1951. pp. 35. 50 refs.

Reviews the present state of knowledge on the use of 2,4-D, 2,4,5-T, and MCPA as selective weed-killers.

1301. LUNDBERG, H. Lövröjning med flygplanen. **[Eradicating hardwoods from aircraft.]** *Skogen* 39 (11), 1952 (221–2, 234). [Sw.]

An experiment in spraying by helicopter was made in July, 1951, on a total area of 72 ha., divided into 18 plots, comprising a recently clear-felled area covered mainly with small Spruce and Birch of all sizes, and a burnt area with natural regeneration consisting almost entirely of Birch. Each flight line was 25 m. broad, and the helicopter flew just above tree height. Three preparations, each of 3 concentrations, were used, a methoxone type, a 2,4-D ester and a mixture of esters of 2,4-D and 2,4,5-T. A quantity of 25 litres/ha. was used, allowing the helicopter to spray 6 ha. in each flight. An examination in August, 1952, showed that the 2,4-D ester and the mixed esters of 2,4-D and 2,4,5-T had killed Birch and Willow almost completely. Areas sprayed with methoxone were less satisfactory. There was no serious damage to either Pine or Spruce. The few older Aspens in the area seemed resistant to the chemicals and had to be dealt with by hand. Further experiments were made in 1952. Costs, based on the 2 years' work, are estimated at ca. Kr.75/ha. for areas of a few hundred ha. and rather less for larger areas.

1302. **Herbicides and arboricides.** *Colon. Res., Lond. 1951/52*, 1952 (208–9).

Experiments are in progress in East Africa on the use of herbicides in tsetse control. The efficacy of esters of various chlorinated phenoxyacetic acids for controlling Miombo regeneration (*Isoberlinia globiflora* dominant) and thorn-bush regeneration (*Dichrostachys glomerata* and *Markhamia obtusifolia* dominant) is being tested.

A technique was devised for use in the field to compare chemical defoliant treatments on a micro scale. This involved the application of measured droplets of solutions to individual leaves or leaflets. Using this technique, 34 compounds were tested for defoliant activity on *Grewia bicolor*, *Combretum parvifolium*, and *Hippocratea obtusifolia*, representative woody plants of wide-spread tsetse habitats in Tanganyika. Many of these gave good results, the most promising from the practical point of view being derivatives of the endoxohydrophthalic acids and the chlorinated phenoxyacetic acids. A comparison of the phenoxyacetic acids in various formulations showed no large differences, but there was a tendency for the ester formulations to be the most effective. Dosages were investigated, and with the chloro- and nitrophenols it was possible to obtain 'supraoptimal' dosages at which the degree of leaf-fall was no greater, or even smaller, than at lower dosages. Species varied greatly in susceptibility to different compounds. A further series of experiments is being conducted.

1303. MATTHEWS, L. J. **Chemical methods of weed control.** *N.Z. J. Agric.* 84 (4; 5), 1952 (273–9; 409 . . . 416). A.P.B.

Includes notes on Blackberry, Gorse and Willow.

1304. VEER, E. J. VAN A. DE, and VINK, A. P. A. Bestrijding van alang-alang met mechanische en chemische middelen. **[Mechanical and chemical control of *Imperata cylindrica*.]** *Tectona* 42 (1/2), 1952 (97–116 + 6 photos). 6 refs. [Du.e.]

[Cf. *For. Abstr.* 13 (No. 230).] Describes experiments in the control of *I. cylindrica* (1) by spraying with Na_2HSO_3 snd 'Shell weedkiller K', which did not give satisfactory control, and (2) by repeated shallow cultivation with a tractor-drawn 'Rome ploughing harrow', which gave good control. For the light lateritic soils of Java it is recommended that such cultivation, on the contour, followed by sowing of legumes, should be employed.

1305. **Weed control.** *Rep. Conserv. For. Ceylon 1951*, 1952 (*G*9–*G*11).

Some control of *Imperata cylindrica* in Teak plantations has been obtained by the introduction of '*Boga medalloa*' and *Flemingia strobilifera* into young

plantations. Spraying with Na_2HAsO_3 to free firelines of this inflammable grass has reduced vigorous growth without eradicating it.

Lantana aculeata threatens the highly successful afforestation areas in the dry patana grasslands of the Uva Province. Experiments with various treatments showed that beating down and burning is the most economical, expeditious, and effective. Vigorous regrowth followed initial die-back from $NaClO_3$ and Fernoxone sprays. Cutting and poisoning the stumps with Na_2HAsO_3 is effective but expensive and difficult to carry out.

442. *Parasitic (Higher) Plants. Climbers and Epiphytes*

1306. PAINE, L. A. **The susceptibility of Pear trees to penetration and toxic damage by Mistletoe.** *Phytopathologische Zeitschrift, Berlin* 17 (3), 1950/51 (305–27). 16 refs. [E.g.] [Swiss Federal Institute of Technology, Zürich.] O.R.S.

Annual inoculations were made from 1947 to 1949. Hypertrophic reaction and susceptibility to toxic damage were found to increase with successive inoculations. Branch penetration was most successful with Mistletoe from Maple and Apple and much less so with that from other Pears. Varieties of Pear varied in their susceptibility to penetration and toxicity. The most recent year's growth seemed to have less mechanical resistance to penetration than the relatively thick, rough bark of the older branches. When the Mistletoe berries were protected from rain the skins dried without toxic damage to the Pear branches; on subsequent exposure to rain, toxic substances were dissolved and transported to the sensitive tissues of the host. A large number of cankers from the inoculations were centred on buds, probably because toxic elements from the germinating embryos were washed down the branches by rain and easily penetrated the buds. Toxicity varied with Mistletoe from different hosts in the following increasing order: Pear, Maple, Lime, Apple, Fir. [Cf. *For. Abstr.* 12 (No. 3368.]

443. *Fungi and Bacteria*

See also Nos. 1026, 1028, 1275–8.

1307. MILLER, P. R., and O'BRIEN, M. **Plant disease forecasting.** *Bot. Rev.* 18 (8), 1952 (547–601). Numerous refs.

History and methods of forecasting throughout the world, including a brief section on *Endothia parasitica.*

1308. SAWADA, K. **Researches on fungi in the Tohoku district of Japan (II). Ascomycetes and Protomycetes.** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 53, 1952 (135–94). [Jap.]

Lists 127 species and their hosts and gives Latin descriptions of 17 new species. There are indexes to the fungi and their hosts, about 70 of which are tree species. [Cf. *For. Abstr.* 13 (No. 3119).]

1309. BAGCHEE, K. **A review of work on Indian tree diseases and decay of timber and methods of control.** Forest Research Institute, Dehra Dun. 1952. pp. 7. 17 refs. (6th British Commonwealth Forestry Conference, Canada, 1952.)

443.2. Diseases of Seed and Seedlings; Damping Off etc.

See also Nos. 1155, 1160.

1310. VAARTAJA, O. **Forest humus quality and light conditions as factors influencing damping off.** *Phytopathology* 42 (9), 1952 (501–6). 23 refs.

The influence of the forest fungus flora and of humus under various conditions of light and temperature was investigated. In the main experiments, seeds and seedlings were not directly inoculated but were exposed to the whole flora of the humus. In other experiments the pathogenicity of certain isolated fungi was demonstrated in pure culture. *Pinus sylvestris* and *Betula verrucosa* suffered no marked damping off in seedbeds of sand and humus from different forest types in experiments conducted out of doors in strong illumination. With low illumination in the laboratory, damping off of many Finnish tree species varied according to the site from which the humus was collected. The more fertile the humus, the greater the mortality of seeds and seedlings. Mortality on humus from fertile *Oxalis-Maianthemum* or *Oxalis-Myrtillus* types was often 100%. Damping off, especially of Birch, was also dependent on the daily duration of illumination, if intensity and temperature were low. At least 9, and probably more, of the fungi isolated from seedlings proved to be potentially pathogenic. Those most commonly isolated were *Papulospora* sp., *Fusarium* spp., *Botrytis* sp. and *Mucor ramannianus.* In culture tests, using *P. sylvestris* as a host and 3 of the isolated fungi as pathogens, the relationship between illumination and damping off was confirmed.

1311. JEVTIĆ, M. Neka zapažanja u vezi sa upotrebom plavog kamena sa suzbijanje fuzarioze u šumskim rasadnicima. [**Some observations on the use of $CuSO_4$ for controlling damping off due to *Fusarium* in forest nurseries.**] *Šumarstvo* 5 (1), 1952 (52–6). 1 ref. [Serb.]

Describes the results of using an aqueous solution of $CuSO_4$ against different species of *Fusarium* in Pine nurseries. The concentration used was 0·3–0·5% at 6–10 litres/sq. m. (for heavy, clayey, and moist soil, the figures were 0·5–0·7% and 4–6 litres/sq. m., respectively). Results were very good, while plants in control plots died off. No difference in effect could be observed when the solution was poured on the soil only or on the plants as well, or when a stronger solution was used in smaller volumes, provided that the amount of $CuSO_4$ remained unchanged. Nor could any difference be observed when the plants were first sprayed with 1% Bordeaux mixture.

1312. ITÔ, K., and KONTANI, S. **Notes on damping-off and root rot of woody seedlings. (I) Relation between the mycelial growth of causal fungi and the concentration of fungicides. (II) A comparative study of isolates of *Rhizoctonia solani*: with special reference to their parasitism.** *Reprs.* from *Rep. For. Exp. Sta. Meguro, Tokyo* No. 60, 1951 (65–97). 27 refs. [Jap.e.]

Four fungicides, Uspulun, Ceresan, pyroligneous acid and $Al_2(SO_4)_3$ were used against *Pythium* sp.,

Rhizoctonia solani and *Fusarium* sp. isolated from damped-off seedlings. The lowest concentrations (*c*) needed to check mycelial growth are shown in tables. Uspulun did not reduce germination of seeds of *Pinus densiflora* below *c* 1%, but pyroligneous acid completely prevented it at *c* 0·5%. Good germination was obtained with all concentrations of Ceresan, and germination ranging from 12·5 (*c* 5·0%) to 28·5% (*c* 0·5%) were obtained using $Al_2(SO_4)_3$. Forty-three isolates of *Rhizoctonia solani* from 11 hosts, including *Pinus densiflora*, *P. thunbergii*, *Larix leptolepis*, *Chamaecyparis obtusa*, *Cryptomeria japonica*, *Abies mayriana* and *Picea glehnii*, were divided into 8 strains. Results of inoculation experiments do not suggest, as has been stated by other workers, that *R. solani* is more virulent on the host from which it was originally isolated than on other host species. Data on pathogenicity and the resistance to fungicides of the different strains are given. Results are shown in tables with English legends.

1313. Cox, R. S., and Comegys, W. R. **Notes on apparently undescribed species of *Rhizoctonia* on conifer seedlings.** *Abstr.* in *Phytopathology* 42 (9), 1952 (464–5).

A description of the species that causes damping off of seedlings, and is associated with root rot and needle blight.

1314. Boyce, J. S., Jr. **A needle blight of Loblolly Pine caused by the brown-spot fungus [*Scirrhia acicola*].** *J. For.* 50 (9), 1952 (686–7). 10 refs. [Cf. *For. Abstr.* 14 (No. 427).]

1315. Johannes, H. *Septogloeum populiperdum* sp. n. als Erreger eines Pappelsterbens. [***S. populiperdum*, cause of a lethal disease of Poplar.**] *Phytopathologische Zeitschrift, Berlin* 17 (4), 1950/51 (406–10). 4 refs. [G.]

S. populiperdum has been found in Germany on *Populus vernirubens*, *P. bachelierii*, *P. generosa* and *P. robusta*. [Cf. *For. Abstr.* 13 (No. 417).]

443.3. Diseases of Older Stages

Stem, Butt and Root Rots; Root Diseases

See also No. 1280.

1316. Roth, L. F. **Factors affecting the rate of decay of old-growth Douglas Fir by *Fomes pini*.** *Abstr.* in *Phytopathology* 42 (9), 1952 (518–9).

A report on a study of the influence of number of infections per tree, decay capacity of fungus isolates, and inherent resistance of the wood.

1317. Hussain, S. M. ***Fomes annosus* (Fr.) Cke., a common root-rot.** *Pakistan J. For.* 2 (3), 1952 (216–20 + 1 plate). 9 refs.

F. annosus has been found for the first time in the Murree Hills, Pakistan, attacking *Pinus excelsa* and *Aesculus indica*. It was observed that if the soil pH was raised by liming to 7·5 or 8, sporophore production by this fungus was markedly reduced.

Wilts, Diebacks etc.

1318. True, R. P., Staley, J. M., Leach, J. G., Barnett, H. L., and Dorsey, C. K. **Liberation of spores from natural reservoirs facilitates overland spread of Oak wilt.** *Abstr.* in *Phytopathology* 42 (9), 1952 (476).

In trees that have died from *Chalara quercina* attack, the fungus spreads from the wood into the bark, and fungus cushions composed in part of pseudoparenchyma and characterized by daedaloid contact surfaces develop at the cambium. As these pressure cushions grow and swell they rupture the bark. The fungus sporulates abundantly and gives off a characteristic odour, which is apparently attractive to insects. Since insects can spermatize mycelial mats and are also potential vectors, effective control measures must be taken before such pressure cushions break the bark. [Cf. *For. Abstr.* 14 (Nos. 997–8).]

1319. McLaughlin, W. D., and True, R. P. **The effects of temperature and humidity on the longevity of conidia of *Chalara quercina*.** *Abstr.* in *Phytopathology* 42 (9), 1952 (470).

Conidia stored at 30° C. lived less than 16 days in all humidities tested. At 25° conidia lived less than 30 days except at 20% relative humidity. At 20° conidia were alive in some samples after 111 days, and at 10° after 173 days.

1320. Hoffman, P. F. **Screening chemotherapeutants for control of Oak wilt.** *Proc. Iowa Acad. Sci.* 58, 1951 (139–47). 11 refs. A.P.B.

Gives results from tests of: (1) the effects of a large number of chemicals on spore germination of *Chalara quercina* on agar plates; (2) the wilting of tomato cuttings in mixtures of the toxin produced by *C. quercina* plus different concentrations of various chemicals; and (3) the phytotoxic effects on Red Oak [*Quercus borealis*] of several chemicals inhibiting germination of *C. quercina*. One of the objects of the experiments was to investigate the possibility of inhibiting the toxic action of the fungus in the tree.

Cankers, Stem Rusts etc.

See also Nos. 993, 1307.

1321. Anderson, R. L. **Factors influencing the incidence of *Hypoxylon* canker of Aspen.** *Abstr.* in *Phytopathology* 42 (9), 1952 (463).

Analyses of 211 plots of *Populus tremuloides* in the Lake States region showed no correlation between tree vigour or site index and % of trees infected, though on poor sites a given % of infection causes greater damage than on good sites. Infection is less prevalent in old stands and more in mixed ones. A high incidence of infection is associated with low stand density and the distribution pattern of cankers differs with the density of the stand.

1322. Berducou, J. Le rôle de l'acide indol-β-acétique dans la formation des chancres parasitaires chez les végétaux. [**The role of indole-β-acetic acid in the formation of parasitic cankers on plants.**] *C.R. Acad. Sci., Paris* 235 (4), 1952 (309–11). 3 refs. [F.] O.R.S.

Nectria galligena was shown to secrete appreciable amounts of indole-β-acetic acid, while *N. cinnabarina* in similar conditions failed to synthesize it. The proliferation of tissues in Apple trees attacked by *N. galligena* is caused by this substance.

1323. STEWART, D. M. **Factors affecting control of White Pine blister rust.** *Abstr.* in *Phytopathology* 42 (9), 1952 (475–6).

Pruning of a *Pinus strobus* plantation infected with *Cronartium ribicola* gave the following results 3 years later: (1) the canker being 6 in. from the main stem, entire branches had been cut off—trees 100% canker-free; (2) the canker being nearer the stem, branches had been removed, and the bark around the branch stub excised—trees 69–100% free; (3) the canker being on the upper main stem, the top of the tree had been lopped off below the canker margin—trees 95% free. In the forest, canker elimination was attempted by (*a*) removal of diseased limbs only, and (*b*) removal of all the lower branches and those with cankers in the upper 5 whorls. After 6 years the second method had proved the more successful. On an area initially burned 26 years before planting *P. strobus*, one eradication of *Ribes* gave effective control. On an area burned only 2 years before planting, there was abundant re-growth of *Ribes*, which required 3 separate workings before it could be reduced.

Foliage Diseases

1324. MEYER, H. Die Verbreitung der Douglasiennadelschütten: zum Stand der Krankheitserforschung. [**The distribution of the needle-cast diseases of Douglas Fir: present position of pathological research.**] *Forstarchiv* 22 (1/2), 1951 (5–11). 10 refs. [G.g.]

Reviews the distribution of the diseases caused by *Phaeocryptopus gäumanni* and *Rhabdocline pseudotsugae*, compares their effects, and discusses the basis of immunity and the efficacy of fungicidal sprays. The greatest hope for the future lies in the breeding of resistant strains. [Cf. *For. Abstr.* 14 (Nos. 994, 1125).]

1325. MERKLE, R. Über die Douglasien-Vorkommen und die Ausbreitung des *Adelopus*-Nadelschütte in Württemberg-Hohenzollern. [**The distribution of Douglas Fir and the spread of the Swiss needle-cast disease in Württemberg-Hohenzollern.**] *Allg. Forst- u. Jagdztg.* 122 (6/7), 1951 (161–92). 33 refs. [G.g.]

A comprehensive review of the Swiss needle-cast problem in the region, with sections on the Douglas Fir plantations (history, present extent, and races); the disease (history; taxonomy, morphology, biology and origin of the causal fungus, *Phaeocryptopus gäumanni*; course of the disease; its present distribution; factors influencing attack—climate, other site factors, age and genetic constitution of host; and effects); and the future of Douglas Fir in the region (possible methods of disease control or prevention; the Douglas Fir chermes; windthrow).

Large-scale planting began at the turn of the century, so that many plantations are now 30–50 years old. Almost all are of *P. taxifolia* var. *viridis*. The disease, first recorded in 1931, spread so rapidly that in 1940 further planting in state and communal forests was banned. It is still distributed over the whole region and is severe locally, especially on 5- to 30-year-old trees, though during 1943–9 partial recovery has been noted in a few cases. The incidence of attack seems to depend on a complex of climatic, ecological and genetic factors; it appears to be favoured in moist, warm areas, after rainy summers, and on humid sites [cf. *For. Abstr.* 14 (No. 1125)]. Though older trees are more resistant, there is no definite age limit to attack, and no means of judging resistance by external characters. Attacks are seldom lethal, but secondary injuries are frequent and may kill the tree. Volume increment of dominant trees may be reduced to as little as 30% of that in Norway Spruce. Active control with fungicides proved unsuccessful. Sanitation measures such as thinning and pruning are of uncertain efficacy as yet, though they should be applied as prophylactics in still healthy stands; the effect of fertilizing is also uncertain. If planting is to be resumed, it will be essential to select suitable warm, dry sites and to use planting stock from strictly selected trees. Should the progeny of selected seed trees prove reasonably resistant, the extension of plantings might be considered. *Adelges cooleyi* [cf. *For. Abstr.* 14 (No. 1347)] is distributed over the whole region but does not appear to do much damage. Windthrow is likely to be most troublesome on exposed sites with fine-textured soils (clays); on coarse soils (bunter sandstone) and limestone a deeper root system is developed and the trees are fairly windfirm.

1326. SCHULDT, P. H. **Sprays for control of Sycamore anthracnose.** *Proc. Iowa Acad. Sci.* 58, 1951 (201–7). 4 refs. A.P.B.

Tests of various sprays on a Sycamore [*Platanus occidentalis*] avenue infected with *Gnomonia veneta* confirmed the special effectiveness of Bordeaux mixture.

444. VIRUS DISEASES

1327. VARNEY, E. H., and MOORE, J. D. **Strain of tomato ringspot virus from American Elm.** *Abstr.* in *Phytopathology* 42 (9), 1952 (476–7).

Describes a virus causing rings on tobacco, which was transmitted mechanically from mosaic-infected Elms, and which seems to be related to tomato ringspot virus.

1328. WILKINSON, R. E. **Woody plant hosts of the tobacco ringspot virus.** *Abstr.* in *Phytopathology* 42 (9), 1952 (478).

Infection with the tobacco ringspot virus (*Annulus tabaci*) was obtained in several woody plants by mechanical inoculation of seedlings. In general the symptoms produced by the type strain were as follows: mosaic and stunting on *Prunus avium* and *Ulmus americana*; mosaic and narrowing of the leaves on *Acer negundo* and *Fraxinus pennsylvanica*; ringspots and line patterns on *Sambucus canadensis*; and mild mosaic on *Hibiscus syriacus* and *Acer ginnala*. *P. avium* and *A. negundo* tend to recover from symptoms and eventually to produce healthy leaves. The other species seem to remain systemically infected once the virus has invaded the growing points.

45. DAMAGE BY ANIMALS

451. *Mammals*

See also Nos. 1117, 1130, 1167–8, 1191.

1329. KRISHNASWAMY, V. S. **Protection: biological: animals (India).** Forest Research Institute, Dehra Dun. 1952. pp. 5. (6th British Commonwealth Forestry Conference, Canada, 1952.)

1330. BUCKLAND, D. C. **Animal damage to conifers.** *B.C. Lumberm.* 36 (10), 1952 (58 . . . 64).
Describes the characteristics of damage by porcupines, beavers and squirrels, and gives some instances of extensive damage in British Columbia.

1331. NOTINI, G., FORSELIUS, S., BRAMFORD, S., and MELLSTRÖM, B. Vildkaninen på Gotland. **[Wild rabbits on Gotland.]** *Skr. K. Skogshögsk., Stockh.* No. 9, 1952. pp. 112. Many refs. [Sw.e.]
Discusses, with tabulated figures, the introduction, spread and distribution of rabbits on the island of Gotland, the extent of damage to soil, forests, agricultural and horticultural crops, and to sheep-grazing, the trade in the export of rabbit products, the value of repellents in protecting fruit and forest trees, and methods of control. In tests of the three most commonly used repellents on fruit trees in 1950/51, Nimrod and Käbbe Special gave complete protection against rabbits, but earlier results suggest that protection might be less good against larger numbers of rabbits and hares than were actually present. Nimrod caused some damage to and drying of the bark. Harfly was not effective. In experiments on protecting Pine and Spruce in 1948 and 1950 none of the preparations used was satisfactory. Mixtures of blood and water, and lime, blood, and water were effective for a short time but were quickly washed off by rain. Other preparations tested included Bordeaux mixture, Ebenit I in different concentrations, and Good-Rite ZIP. In Gotland no method of control so far tried—shooting, poisoning, trapping or digging out, has proved adequate. The use abroad and in other parts of Sweden of the virus of *Myxomatosis cuniculi* is discussed in detail and its use in Gotland with the other methods is recommended. [Cf. *For. Abstr.* 13 (No. 448).]

1332. TOUFAR, J. Ostružina ochránce listnatých kultur proti okusu zvěří. **[*Rubus fruticosus* protects broadleaved tree plantations against browsing by animals.]** *Lesn. Práce* 31 (7), 1952 (310–1). [Cz.]
R. fruticosus (only the sub-erect forms) can be used on some sites for at least partial protection of any hardwoods and Fir against hares, rabbits, and roe-deer. In September-October (on sunny days), rooted shoots of *R. fruticosus* are pulled out of the soil and cut back to a length of 10 cm. above the collar, after which they are heeled in until next spring, in black humus, covered with a 20 cm. layer of leaves. They are planted in the spring, 1 m. apart. Autumn planting, and sowing, also give good results.

1333. HEYDEN. Der Fegeschutz 'Stachelbaum'. **[The 'Stachelbaum' tree protector.]** *Forst u. Holz* 7 (10), 1952 (138). [G.]
A device for protecting the bark of trees, chiefly from deer. It consists of an upright composed of 2 pieces of twisted wire, with wire cross-pieces of varying lengths at different intervals and angles. It is made in 3 sizes. [Cf. *For. Abstr.* 13 (No. 4010).]

1334. GUSOVIUS, H. Schälschadenschutz durch Sinoxyd in Buchenbeständen: ein Merkblatt für die Anwendung. **[Sinoxyd for protecting Beech stands against bark-scaling damage [by red deer]: a practical guide to its use.]** *Forstarchiv* 23 (1), 1952 (13–4). 2 refs. [G.]
Notes (to supplement the manufacturer's inadequate instructions) on the preparation itself, method and time of application and type of stand which may usefully be treated, consumption of material, preparatory work, organization of the work, and costs and working time in woman-hours. Based on experience at Gottsbüren, Hesse, where the preparation has been used with success since 1949. [Cf. *For. Abstr.* 14 (p. 130).]

1335. HOWARD, W. E., and HJERSMAN, H. A. **Deer repellent sprays not harmful to foliage on two-year-old trees.** *J. Wildlife Mgmt.* 16 (3), 1952 (390–1). 3 refs. B.A.P.
No foliage injury was noticeable on fruit trees sprayed with 3 commercial deer repellents.

1336. UNTERBERGER, W. Wildschäden und Werbungskosten: der Einfluss von Verbiss- und Schälschäden auf die Aufarbeitung schwachen Fichtenholzes. **[Deer damage and conversion costs: the influence of damage by browsing and bark-scaling on the primary conversion of small Spruce wood.]** *Forstarchiv* 22 (1/2), 1951 (11–3). [G.g.]
Gives results from a time study of the extra work necessary in trimming, cross-cutting and barking timber from trees damaged by red deer, and suggests percentage adjustments to wage tariffs for such work.

1337. THOMPSON, D. Q. **Travel, range and food habits of timber wolves [*Canis lupus*] in Wisconsin.** *J. Mammal.* 33 (4), 1952 (429–42). 12 refs. O.R.S.
Includes some data, for the area studied, on browsing of tree species by *Odocoileus virginianus* (the principal food of the wolves) and on damage to *Prunus pennsylvanica* by porcupines.

453. *Insects*

See also Nos. 964–9, 1026, 1028, 1275–8.

1338. Liste officielle des noms français des insectes d'importance économique au Canada. **[Official list of the French names of insects of economic importance in Canada.]** Department of Agriculture, Quebec. 2nd ed. (revised) 1952. pp. 73. [F.E.]
A revised and enlarged edition. Gives scientific, Canadian-French, and English names. [Cf. *For. Abstr.* 9 (No. 804).]

1339. JAHN, E. Forstschädlingsantreten in Tirol 1945–1952. **[Forest pests in the Tyrol during 1945-1952.]** *Anz. Schädlingsk.* 25 (10), 1952 (148–9). 8 refs. [G.]

1340. ROONWAL, M. L. **Forest protection: biological: insects (India).** Forest Research Institute, Dehra Dun. 1952. pp. 5. 7 refs. (6th British Commonwealth Forestry Conference, Canada, 1952.)

1341. QADRI, M. A. H. **Forest protection—biological control.** Pakistan Forest Research Institute, Abbottabad. 1952. pp. 6. 4 refs. (6th British Commonwealth Forestry Conference, Canada, 1952.)

Reviews the possibility of exercising biological control over some of the forest insect pests in Pakistan.

1342. GRYSE, J. J. DE. **Control of forest insects in Canada.** *Proc. UNSCCUR, Lake Success, 1949* 5, 1951 (57–9). 20 refs.

1343. RÖHRIG, H. Standortsfragen in der Forstentomologie. [**Site problems in forest entomology.**] *Forstarchiv* 22 (9/10), 1951 (133–5). [G.]

Emphasizes the comparative neglect by entomologists of site—and especially soil—conditions as they may affect the occurrence of insect outbreaks and the ability of trees to recover after attack, giving a few examples which deserve further study. Urges the need for collaboration between entomologists and those engaged in site studies, including plant sociologists.

1344. BAKKE, A. Skadeinsekter på grankongler og granfrø: en oversikt med bestemmelsestabeller. [**Insects damaging Spruce cones and seed: a survey with a key to determination [of larvae].**] *Tidsskr. Skogbr.* 60 (9), 1952 (214–7). [Nor.]

The insects described are: *Phycis abietella, Grapholitha* [*Enarmonia*] *strobilella, Eupithecia bilunulata, E. pini, Ernobius abietis, Hylemyia anthracina, Plemeliella abietina, Kaltenbachia strobi*, and *Camptomyia strobi.*

Isoptera

See also Nos. 1673–4.

1345. KALSHOVEN, L. G. E. **Survival of *Neotermes* colonies in infested tree trunks after girdling or felling of the trees.** *Tectona* 42 (1/2), 1952 (1–7). [E.]

It was found that when Teak trees infested by *Neotermes tectonae* are girdled, together with others, in thinning operations, they may safely be left standing without injury to the remaining stand, provided they are felled within 8 months, which period may include one dry season. They should, however, be felled well before the end of the second dry season after girdling, as winged termites will swarm from them in the next rainy season, and may found new colonies in adjacent living trees. When girdled, infested trees have inadvertently been left standing for 3 years or longer, including 3 dry seasons, the *Neotermes* colonies are generally so much weakened as to be no longer a major cause of infestation for the surrounding forest.

Hemiptera

See also No. 967.

1346. CROOKE, M. ***Adelges* attacking Japanese and hybrid Larches.** *For. Rec. For. Comm., Lond.* No. 17, 1952. pp. 20. 29 refs. Price 1*s.* 3*d.*

Field observations have shown that, although the most common secondary host of *Adelges* spp. has hitherto been *Larix decidua, A. viridis* is common on *L. leptolepis* and on *L. eurolepis* throughout Great Britain. One record of *A. strobilobius* on *L. eurolepis* was obtained, but this adelgid was not found on *L. leptolepis.* When *A. viridis* attacks *L. leptolepis* a high proportion of the insects feed and develop on the bark and main stem, while on *L. decidua* the greater proportion develop and feed on the needles and fresh bark. *A. viridis* infestation can be readily detected by the existence of colonies of small green lice, each protected by a white, wax-wool covering, by the extensive bark exfoliation in the main stem, the presence of a sooty mould fungus, and by a resin exudation. The practical importance of such infestations is small.

1347. HIERHOLZER, O., and LÜDGE, W. Die Douglasienwollaus, *Gilletteella cooleyi* (Gill.) C.B., in Württemberg-Hohenzollern. [**The Douglas Fir chermes in Württemberg-Hohenzollern.**] *Allg. Forst- u. Jagdztg.* 122 (6/7), 1951 (192–200). 20 refs. [G.]

Reviews the distribution of *Adelges cooleyi* in the region [cf. *For. Abstr.* 14 (No. 1325)], its bionomics and phenology, population variations and factors contributing to outbreaks, significance for forestry (mostly confined to some loss of increment which cannot as yet be reliably estimated or measured), and control. The removal of infested trees is not justifiable, and neither is chemical control except for areas bearing trees that are valuable enough to repay such care. Trials of a number of proprietary insecticides based on BHC, DDT and nicotine are briefly reported, and suitable treatments indicated. For spraying before the flushing period 3% emulsified horticultural carbolineum or 1% DNC can be used. For later spraying most of the preparations tried were effective provided that an adhesive was used, the most economical being 0.5–1% Viton Spritzmittel (a BHC preparation) + 0.2% Adhäsit. Dusting the underside of the twigs with BHC preparations was also effective when the weather remained fine; but though labour costs for dusting are lower, the consumption of insecticide is higher, than for spraying. All the insecticides effective against *A. cooleyi* were equally so against *Dreyfusia nüsslini* [*A. nordmannianae*].

1348. DINTHER, J. B. M. VAN. Twee Coccinellidae als roofvijanden van *Dreyfusia piceae* Ratz. [**Two coccinellids as predators of *D. piceae.***] *Tijdschrift voor Entomologie, Amsterdam* 94 (1/2), 1951 (169–88). 7 refs. [Du.e.] I.I.E.

Reports on a study of the morphology of *Aphideita obliterata* and *Anatis ocellata* and the biology of *Adelges abietis* and these two predators.

1349. HUSSEY, N. W. **A contribution to the bionomics of the green Spruce aphid (*Neomyzaphis abietina* Walker).** *Scot. For.* 6 (4), 1952 (121–30). 7 refs.

After reviewing previous work on the subject, the author gives an account of studies carried out on Sitka Spruce in Midlothian in recent years. He believes that under normal conditions *N. abietina* is unusual in that its feeding activities and habitat on shaded shoots, where the needles would have a short life owing to insufficient light, create conditions that lead to population control by starvation. This is due to the relative immobility of the aphid at the critical winter period. This 'self-imposed' control

suggests that, although damage is at times alarming, it is likely to be serious only in conditions where the foliage of the upper crown and even the current growth become suitable for aphid feeding, e.g. reduction of water supply or of the light available to the needles for assimilation. Heavy defoliation for more than one season is unusual and affected trees usually recover. However, the increase of a serious defoliator of the current needles of Sitka Spruce would alter the status of *N. abietina* from what it is at present—an alarming but usually minor trouble—to that of a really serious forest pest. [Cf. *For. Abstr.* 13 (No. 1356).]

1350. TAPIA, E. A. El pulgón del álamo—*Pterocomma populea* Kalt. **[The Poplar aphid—*P. populea*.]** *Idia* 5 (52), 1952 (13). [Span.] C.G.B.

A brief description of an important pest of Poplar in southern Buenos Aires province and the Rio Negro Territory.

1351. WILKINS, V. E. **San José scale [*Aspidiotus perniciosus*] in Western Europe in 1951.** *FAO Plant Prot. Bull.* 1 (1), 1952 (4–5). I.M.I.

Gives dates of introduction, present status, and preventive measures in a number of countries.

1352. HOPPING, G. R. **The Pine needle scale, *Phenacaspis pinifoliae* (Fitch).** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 8 (4), 1952 (3).

An infestation on ornamental Spruce was controlled by spraying with a mixture of oil and nicotine sulphate at a concentration of 2 gal. oil/100 gal. water/1 pint nicotine sulphate.

Lepidoptera

See also Nos. 965, 968.

1353. ANCHIERRI and GRIVAZ. Poudrage insecticide dans la peupleraie domaniale de Chautagne. **[Insecticidal dusting in the state Poplar plantations of Chautagne.]** *Rev. for. franç.* 1952 (10), (752–8). [F.]

Describes operations against infestations of defoliating insects (*Taeniocampa* (*Orthosia*) *populi* and another, unidentified, lepidopterous caterpillar). Dusting was done from the air (Piper-Cub light aeroplane) and from the ground (Pulvorer 626 motor duster) using Hexapoudre (8% BHC), DD poudre (5% DDT), and Cuvérol M.V. (0·75 rotenone). It is concluded that for the conditions of the experiment (an infestation of moderate extent—less than 1000 ha. of easily accessible plantations) the use of a powerful ground duster is preferable to dusting from the air. Rotenone gave the best control, but BHC was not far behind and is much cheaper (Fr.100/kg. compared with Fr.120/kg. for rotenone and DDT).

1354. MCLEOD, J. H. **Notes on the Lodgepole needle miner, *Recurvaria milleri* Busck (Lepidoptera: Gelechiidae), and its parasites in Western North America.** *Canad. Ent.* 83 (11), 1951 (295–301). 3 refs. O.R.S.

The pest was first discovered in 1943 in the Yosemite National Park, California. Between 1942 and 1950, three new areas of infestation have been found, two in Idaho and one in Alberta. In California, the insect has a 2-year life cycle, emerging in odd-numbered years. In Alberta it normally emerges in even-numbered years, but in 1949 much of the population completed its development in 1 year. The reason for these variations is not known. Parasites are numerous in all areas, the most important being: *Copidosoma nanellae* auct. nec Silv., *Neoderostenus* sp., *Apanteles californicus*, *Sympiesis* sp., *Zagrammosoma americana* and *Dicladocerus* sp. [Cf. *For. Abstr.* 8 (No. 2764).]

1355. MILOSAVLJEVIĆ, R. Neki podaci i zapažanja u vezi sa pojavom jelinog savijača na Tari. **[Some data and observations in connexion with the appearance of *Epiblema proximana* at Tara.]** *Šumarstvo* 4 (6), 1951 (385–6). [Serb.]

Since July, 1950, the mixed Fir/Beech/Spruce stands at Titovo Užice have been invaded by *E. proximana*, so far attacking only Fir of all age classes. The area affected in July 1951 was 2500 ha.

1356. BALCH, R. E. **Aerial spraying in New Brunswick.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 8 (4), 1952 (1).

About 200,000 acres of uneven-aged Balsam Fir/Spruce forest with a high proportion of mature Balsam Fir and infested with black-headed and Spruce budworm, was sprayed from the air in June 1952 with DDT used at a rate of 1 lb./1 U.S. gal. of proprietary solvent/acre. Spraying was done by 20 Stearman planes and 1 Beaver plane fitted with spray booms fed from constant-pressure tanks. Assessment of the effects on the budworm is being carried out on daily quantitative samples. Preliminary results indicate a remarkably high mortality from the spray, amounting to almost complete elimination of the budworm from the sprayed area.

1357. BROCKMAN, C. F., and BERRY, D. **The Chesimnus experimental Spruce budworm control project.** *Res. Bull. Ore. Bd. For.* No. 5, 1950. pp. 22 + map.

This project was designed to study the possibility of lowering direct costs of Spruce-budworm control, without sacrificing effectiveness, by either reducing the amount of DDT in the spray mixture or using different and cheaper poisons and carriers. Over a million acres were sprayed in the course of the experiment. Results indicated that neither dieldrin [cf. *For. Abstr.* 13 (No. 4016)] nor toxaphene is a suitable substitute for DDT in control of the Spruce budworm. Either a combination of GA-10 solvent and No. 2 fuel oil [actual or reputed] or GA-10 solvent alone, is a satisfactory carrier, causing no apparent damage to foliage. The quantity of DDT may be safely reduced to $\frac{3}{4}$ lb. gal. of solution when applied at the rate of 1 gal./acre under conditions that permit of even distribution. Helicopters are better suited than fixed-wing aeroplanes for spraying small blocks of forest.

1358. MILOSAVLJEVIĆ, R. Dudovac (*Hyphantria cunea* Dru.)—vrlo važan problem za našu privredu. **[*H. cunea*—a problem of great importance for the Jugoslav economy.]** *Šumarstvo* 5 (1), 1952 (39–50). 14 refs. [Serb.e.]

H. cunea, first observed in summer 1949 in the Vojvodina (N.E. Jugoslavia), spread during the 3 following years to the west and south over a distance of 180 km., reaching Croatia. In 1950 and 1951,

two complete generations were observed each year, and a third generation (not complete) appeared in 1951 owing to a warm autumn. Imagos of the first generation appeared in May and 1st-generation larvae in June, and imagos and larvae of the 2nd generation in July and August, respectively. During 1950–1 *H. cunea* attacked, in the first place, *Morus*, but also 38 other species of fruit, forest, and ornamental trees, bushes and plant crops, including *Prunus*, *Pyrus*, *Cydonia*, *Juglans*, *Corylus*, *Vitis vinifera*, *Acer*, *Quercus*, *Populus*, *Salix*, *Ulmus Fraxinus*, *Tilia*, *Robinia*, and *Platanus*. So far the chief method of control has been to cut off and burn the larvae-infested twigs. DDT has proved the most effective of the insecticides used. [Cf. *For. Abstr.* 14 (No. 495).]

1359. Haine, E. Weitere Bekämpfungsversuche mit *Euproctis chrysorrhoea* L. und *Diprion sertifer* Geoffr. [**Further control experiments with *E. chrysorrhoea* and *D. sertifer***.] *Anz. Schädlingsk.* 25 (9), 1952 (129–32). 2 refs. [G.]

Experiments were made to find the effects of early treatment of winter nests of *Euproctis chrysorrhoea* with some dinitro-cresol preparations. The results were on the whole unsatisfactory. Further experiments in spraying and dusting *E. chrysorrhoea* with various insecticides demonstrated the advisability of treating the larvae in the 2nd or 3rd instar. Sprays of the same insecticides on *Diprion sertifer* gave satisfactory results.

1360. Derris ter bestrijding van de rupsenplaag in Amsterdam. [**[The use of] derris in controlling caterpillars in Amsterdam.**] *Meded. Inst. Trop. Amst.* No. 98 (*Afd. trop. Prod.* No. 38), 1952 (41–4, 69–70). 3 refs. [Du.e.] L.S.

Dusting the city's Elms and Limes with a derris preparation containing 1% rotenone between 18 June and early July, effectively controlled *Malacosoma neustria* and *Orgyia antiqua*. Damage to Lime by *Caliroa annulipes* was controlled in the centre of the city, but was rather heavy in S. Amsterdam where dusting was done too late.

1361. Heqvist, K.-J. Allmänna fjädertofsspinnarens (*Orgyia antiqua* L.) uppträdande i Norrland åren 1947 och 1948. [***O. antiqua* in Norrland during 1947 and 1948.**] *Norrlands SkogsvFörb. Tidskr.* 1952 (1), (45–63). 14 refs. [Sw.sw.g.]

Discusses the biology of this insect, its distribution, the extent of the damage to a number of trees and shrubs in 1947–8, and its parasites and diseases.

1362. Šlander, J. Biološko suzbijanje gubara. [**Biological control of *Lymantria dispar***.] *Šumarstvo* 2 (4), 1949 (22–32). 10 refs. [Croat.]

Stresses the rôle played in the control of *L. dispar* by parasites, fungi and bacteria, in particular by *Anastatus disparis*, and by the pupal parasites of *L. dispar*. Describes a method of breeding *A. disparis:* a trench ca. 30 cm. deep (length and width as required), with sloping walls, is dug in water-permeable soil, and a rough floor made from e.g. waste board ca. 5 cm. above the bottom. Egg masses of *L. dispar* are put into the trench to a height of ca. 20 cm., and the whole is covered with branches. In the spring, the unparasitized *L. dispar* larvae appear on the surface, their escape being prevented by surrounding the trench with wooden laths smeared with axle grease. They are then killed with DDT, leaving only the parasitized eggs in the trench. A similar method is described for breeding pupal parasites such as *Tachina larvarum*. Pigs should be excluded from forests where parasites are bred or they will destroy most of them. [Cf. *For. Abstr.* 13 (Nos. 3171, 4039).]

1363. Nonveiller, G. Suzbijanje gubara u šumama zamaglijivanjem iz aviona (kratki prikaz avioakcije u 1949 god.). [**Control of *Lymantria dispar* in forests by spraying from aircraft (a brief report of the aircraft operation of 1949.)**] *Šumarstvo* 2 (6), 1949 (31–45). 4 refs. [Croat.croat.]

53,000 kg. of the insecticide (16·5% solution of DDT) were sprayed on a total area of 24,066 ha. The efficiency was found to be 100% when the insecticide was used in concentrations not below 2 kg./ha.

1364. Chararas, K. Paratērēseis epi tēs dia chēmikōn mesōn katapolemēseōs tou *Thaumetopoea pityocampa* Schiffermüller (Lepidoptera-Thaumetopoeidae) (*Cnethocampa pityocampa*). [**The chemical control of *T. pityocampa***.] *Dasos* No. 18, 1952 (37–44). [Gk.f.]

Describes the author's own experiences with small-scale spraying, using 5 formulations. Results (tabulated) indicate that γ BHC mixed with E605 is the most effective and Oct.–Nov. the best time.

1365. Šlander, J. Bionomija borovog litijaša (*Cnethocampa pityocampa*). [**Bionomics of *Thaumetopoea pityocampa***.] *Šumarstvo* 3 (2/3), 1950 (112) [Croat.]

In 1949 and 1950, pupation in a Pine forest at 100 m. altitude in N.W. Jugoslavia began late in February. In 1949, the imagos appeared in July, contrary to the 1-month transformation period mentioned in literature.

1366. Weidner, H. Kahlfrass durch den Eichenprozessionsspinner. [**Defoliation by *Thaumetopoea processionea***.] *Anz. Schädlingsk.* 25 (10), 1952 (151). [G.]

Describes a case of complete defoliation of Oaks in Pevestorf, Lower Saxony.

Coleoptera

See also No. 969.

1367. Hadlington, P. **Forest insects and wood-destroying insects of New South Wales. Part VI. Insects attacking the living and dying trees [: the jewel beetles or flat-headed borers].** *Tech. Notes For. Comm.* (*Div. Wood Technol.*) *N.S.W.* 5 (4), 1951 (7–9).

Describes *Diadoxus erythrurus*, *Prospheres moestis*, *Melobasis iridescens* and *M. splendida*, and *Paracephala cyaneipennis* and damage done by them.

1368. Roonwal, M. L. **Study of a recent epidemic of the Sal (*Shorea robusta*) heartwood borer, *Hoplocerambyx spinicornis* (Newman) (Coleoptera, Cerambycidae) in the Nahan Forest Division, Himachal Pradesh, India.** Forest Research Institute, Dehra Dun. 1952. pp. 7. 10 refs. (6th

British Commonwealth Forestry Conference, Canada, 1952.)

Analysis of data on this outbreak has shown that the beetle prefers to attack trees of girth class 30–53 in. Very young trees (12 in. g.b.h. and less) are hardly attacked at all. Above the 53-in. girth class, attack is random.

1369. KUDLER, J. Hromadny škodlivý výskyt tesařika *Saperda carcharias* L. na osikách na Hronovsku. [**Mass outbreak of *S. carcharias* on Aspen in the Hronov district.**] *Lesn. Práce* 31 (3), 1952 (122–5) [Cz.]

From a sporadic outbreak in 1949, the pest became serious in 1951 when the Aspens in a mixed stand of Aspen, Spruce, Fir, Oak, Beech and Pine, were attacked by *S. carcharias* and also *S. populnea*. Trees 10–12 years old, 10–15 m. high and 7–10 cm. d.b.h. were most affected.

1370. REID, R. W. ***Hypomolyx piceus* (DeG.) on Lodgepole Pine [in Alberta].** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 8 (4), 1952 (2–3).

1371. SOWDER, J. E. **A sanitation-salvage cutting in Ponderosa Pine at the Pringle Falls Experimental Forest.** *Res. Pap. Pacif. Nthwest. For. Range Exp. Sta.* No. 2, 1951. pp. 24 + 2 photos. 21 refs.

A total of 4988 thousand bd. ft., including 210 thousand bd. ft. in dead trees and an average of 1·2 per acre of live trees considered highly susceptible to insect attack, was removed from 3020 acres of virgin Ponderosa Pine. Stumpage return amounted to $24·29/1000 bd. ft., and logging costs, including the construction of 19·2 miles of main utilization roads and logging spurs, to $23·07/1000 bd. ft. It is estimated that a net gain of $1·07/acre/year will be obtained as a result of increased net growth and of capital investment in stand improvement and road construction. An appendix includes tabulated results, and keys to identify trees susceptible to insect attack.

1372. CHARARAS, K. Entomologikai epidraseis epi emprēstheisēs *Pinus laricio*. [**Insect damage to burnt *P. laricio* [*P. nigra* var. *calabrica*].**] *Dasos* No. 6/7, 1948 (24–30). [Gk.]

Brief account of the extensive forest fires in Greece in 1945 and of the barkbeetle outbreak that, despite accelerated utilization (the State alone removing 80,000 cu.m. of timber in 4 months of 1946) followed the fires. The various species found on the Pine are described.

1373. MERKER, E., and MÜLLER, H. Die Abhängigkeit des Frasses der Fichtenborkenkäfer vom Bodenklima. [**The dependence of Spruce bark-beetle attack upon soil climate.**] *Allg. Forst- u. Jagdztg.* 123 (1), 1951 (16–20). 5 refs. [G.]

An account of studies in the Radolfzell forest district, S. Baden, where an outbreak of *Ips typographus* has killed ca. 157,549 cu.m. of Norway Spruce between 1944 and 1949, attacking first and most severely the stands on dry gravelly and morainic soils. After a brief review of local climatic variations to illustrate the general relation between drought years and beetle attack, the authors describe studies made in 1949 (dry) and 1950 (fairly wet) on the soil moisture and % of gravel in the soil of stands with various degrees of attack, and on the physiological state of individual sound and attacked trees, in a single stand, as indicated by osmotic values of the bark sap and moisture content of the bark. Results confirm that both *I. typographus* and *Pityogenes chalcographus* attack chiefly, and most severely, trees whose water supply is deficient. Trees with slight fungus attack had a lower bark moisture content, even in the moist summer, than sound trees, and in the dry summer such trees quickly succumbed to the combined effects of soil drought, fungus and insect attack.

1374. KAMP, H. J. Zur Kenntnis von *Phloeosinus thujae* Perr. [**Notes on *P. thujae*.**] *Allg. Forst- u. Jagdztg.* 123 (1), 1951 (26–7). [G.]

Describes the beetle and the galleries made by adults and larvae, with notes on its biology in Württemberg, where it attacks *Juniperus communis*, *Thuja plicata* and *Chamaecyparis lawsoniana*. [Cf. *For. Abst.* 13 (No. 499).]

1375. **[Defoliation of Eucalypts by adult cockchafers.]** *Rep. Commonw. sci. industr. Res. Organ. Aust. 1949/50*, 1951 (61).

From time to time the adults of several native cockchafers cause extensive defoliation of Eucalypts in New South Wales, species belonging to the following being involved—*Anoplognathus*, *Liparetrus*, *Heteronyx*, *Automolus*, and *Anodontonyx*. The facts that the major chafer defoliators have slightly different feeding habits, and that the peaks of their abundance do not coincide, greatly intensify the injury they cause. Some species of Eucalypt are highly attractive to the beetles, others moderately so, and others not at all. The order of preference varies somewhat with the species of beetle. Apart from such inherent attractiveness, the most important factor determining the degree of damage done to a tree is the density of the surrounding stand. The wider the spacing of the trees, the greater is the damage.

1376. SCHIFFERLI, A. Über die Maikäferbekämpfung mit neueren Insektiziden und deren Auswirkung auf die freilebende Tierwelt. [**Cockchafer control with new insecticides and its effect on free-ranging animals.**] *Repr.* from *Der Ornithologische Beobachter*, *Basel* 48 (1), 1951 (1–15). 10 refs. [G.] B.A.P.

Discusses, mainly on the basis of Swiss and American findings, the effects of the use of DDT and BHC on the forest fauna and on domestic animals and humans, a problem that has increased in importance with the probable necessity of increasing the intensity of sprayings for adequate control of cockchafers. Operations in Ajoie (Bernese Jura) with DDT and BHC preparations in 1950 produced no observable decline in bird populations except in a strip of forest margin which was particularly intensively sprayed. Birds in captivity fed with poisoned insects over a period of time showed slight symptoms of poisoning and loss of weight in comparison with controls.

Hymenoptera

See also Nos. 966, 1360.

1377. KALANDRA, A. Prognosa rojení ploskohřbetky smrkové—*Cephaleia abietis* L. [**Prognosis**

of the swarming of *C. abietis*.] *Lesn. Práce* 31 (6), 1952 (274–5). [Cz.]

Larvae of *C. abietis* attacking Spruce trees in various parts of Czechoslovakia in the summer of 1950, hibernated in soil, where their numbers amounted to as much as 1000/sq. m. to a depth of 30 cm. They often remain in the soil for 1, 2, or 3 years before swarming. The Forestry Research Institute, Zbraslav II, is investigating the validity of Scheidter's statement (1916) that before pupating, the larvae develop a pair of large elliptical eyes in addition to the ocelli.

1378. BENSON, R. B. **A new *Anoplonyx* destructive to Larch in Britain (Hymenoptera: Tenthredinidae).** *Bull. ent. Res.* 43 (3), 1952 (543–7). 7 refs.

A Larch defoliator of the genus *Anoplonyx*, which has become increasingly widespread in Britain of late years, differs from the central European sawfly *A. duplex* in several respects, e.g. the larva of the British species is green with 4 longitudinal brown stripes, quite unlike the brown and black flecked, muddy green larvae of *A. duplex*. Examples of the British species, which is here named by the author *A. destructor* sp. nov., have also been found in Finland. A key to the European spp. of *Anoplonyx* is appended.

1379. ELTON, E. T. G. De bestrijding van de gewone dennenbladwesp (*Diprion*) (= *Lophyrus*) *pini* L.) met chemische middelen. [**The control of *D. pini* by chemical means.**] *Repr.* from *Tijdschrift der Nederlandsche Heidemaatschappij, Arnhem* 1951 (109–17). [Du.]

Discusses the biology and life history of *D. pini*, diseases, parasites and predators, the effect of damage to trees, costs of control with BHC (estimated at Fl.20–45/ha.), the possible harmful effects of chemical control, and early recognition of attack.

1380. THALENHORST, W. Das Auftreten von Kiefernbuschhornblattwespen in Norddeutschland 1949. [**The outbreak of *Diprion* spp. in Germany during 1949.**] *Z. angew. Ent.* 34 (1), 1952 (45–64). 10 refs. [G.g.]

Presents the results of studies of the outbreaks of *Diprion frutetorum* and *D. sertifer*, i.e. distribution and extent of damage, climatic factors, other factors influencing population numbers, control measures and their success.

1381. WEST, A. S. **Notes on Leconte's sawfly.** *Canad. Ent.* 84 (2), 1952 (59–61). 3 refs. O.R.S.

Notes on a heavy infestation of *Neodiprion lecontei* on *Pinus strobus* and *Pinus resinosa* in Ontario. In 1946 both species had been attacked, and in some cases *P. strobus* was heavily infested, while neighbouring *P. resinosa* were free or nearly so, indicating selective oviposition. In 1947–8 the infestation was extremely light and confined to *P. strobus*. [Cf. *For. Abstr.* 5 (246).]

1382. KALANDRA, A., and KOLUBAJIV, S. Nový způsob hubení smrkových pilatek *Pachynematus scutellatus* a *P. montanus*—poprašováním rojícího se dospělého hmyzu dynocidem. [**New method of controlling *P. scutellatus* and *P. montanus* by dusting the swarming adult insects with contact insecticide.**] *Lesn. Práce* 31 (3), 1952 (125–9). [Cz.]

Laboratory tests (1950) have shown that half an hour after dusting with 5% Gesarol, the imagos of *P. scutellatus* fell from the branches and within 24 hours most of them were dead. In April, 1950, first field tests were carried out on the emerging swarms on two 100-sq.m. experimental areas, using in all 1 kg. each of 5% Gesarol and BHC. Three days after dusting, 31–148 dead insects (about half of them ♀) were found per sq.m. Larger-scale dusting was done in May in several places (also from aircraft), always with good results. Among insects swarming near the ground ♂s preponderated, as against a ♂/♀ ratio between 1/2 and 1/12 for dead insects falling from higher levels. In May–June, 1951, dusting gave good results in an outbreak of *P. scutellatus* and *P. montanus* in Bohemia.

1383. BUTCHER, J. W., and EATON, C. B. **The Larch sawfly epidemic in the Lake States. Surveys and spraying experiments in 1949 and 1950.** *Mimeo. U.S. Bur. Ent.* No. *E*–841, 1952. pp. 8. 5 refs.

Mortality of *Pristiphora erichsoni* from a single spray application of DDT at a rate of 1 lb. DDT in 1 gal. fuel oil/acre may not exceed 70%, and the usefulness of DDT in controlling such outbreaks is therefore open to question. Sprays may be useful, however, in reducing damage in stands already weakened by repeated attacks.

1384. HANSON, H. S. ***Megastigmus* seedflies [in Britain].** *Quart. J. For.* 46 (4), 1952 (26–4).

Notes on life cycle, history of known infestations in Britain, and indications of present distribution.

459. *Other Animals*

See also No. 1156.

1385. MEYER, J. Édification de galles multiples par une même fondatrice et peuplement des galles d'*Eriophyes macrorhynchus* Nal. sur *Acer pseudoplatanus* L. [**Formation of multiple galls by the same fundatrix, and population of the galls of *E. macrorhynchus* on *A. pseudoplatanus*.**] *C.R. Acad. Sci., Paris* 235 (22), 1952 (1428–30). 5 refs. [F.f.] O.R.S.

The mobile spring fundatrix causes multiple galls, which under the influence of repeated gall-forming visitations reach adult size before the main summer increase in *E. macrorhynchus*. In 1950, the first eggs, very few in number, were laid on 5 May, and at the end of May the galls, now full size, were still almost empty; by late July they were fully populated and by October almost empty again, suggesting that the winter migration had taken place.

46. DAMAGE TO TREE GROWTH BY MAN

1386. NEFF, L. P. **Logging damage to reproduction under Swamp Black Spruce [*Picea mariana*].** *Tech. Note Lake St. For. Exp. Sta.* No. 381, 1952. pp. 2.

No significant differences in damage were noted between horse and tractor skidding or between logging by farmer-operator and by hired labour.

48. INJURIES DUE TO UNKNOWN OR COMPLEX CAUSES

1387. HUBERT, E. E., and FERRELL, W. K. **Radioisotope tests of translocation in artificially infected *Pinus monticola*.** *Abstr.* in *Phytopathology* 42 (9), 1952 (515).

Preliminary results of attempts to find the cause of pole blight of Western White Pine by studying the effects on translocation of certain fungi isolated from pole-blighted trees, indicate that bark lesions on the trunk seriously obstruct the downward movement of P^{32} in the phloem.

1388. WRIGHT, E., and GRAHAM, D. P. **Surveying for pole blight.** *J. For.* 50 (9), 1952 (680–2). 5 refs.

[Cf. *For. Abstr.* 11 (No. 3362).] In locating pole blight of *Pinus monticola* from the air it was found advantageous to fly western slopes in the morning and eastern slopes in the afternoon, to make the most effective use of light. Some blighted stands located from the air were never found by ground crews even after repeated attempts. In two such instances the areas were re-flown and, while the planes were circling and rocking over them, ground crews took compass bearings on the position of the planes, and next day, by following the compass bearings, arrived at the locations without further delay. This procedure should prove of considerable value for use in future surveys. Observation and mapping from the air, followed by inspection by ground crews, is the most satisfactory way of covering the region quickly, economically and completely. For best results, aerial survey requires a slow, powerful, 3- to 4-seater plane and a pilot skilled in mountain flying.

1389. SCHINDLER, U. Das Buchensterben. [**Beech disease.**] *Forstarchiv* 22 (7/8), 1951 (109–19). 62 refs. [G.]

A general review of literature, dealing with the disease under the heads: symptoms, distribution in Europe and America, site and stand conditions, the bark patches with slime flux, occurrence during the last 50 years, damage done, possible causes and control measures. Emphasizes particularly the diversity of causes suggested by different authors and the probability that a whole complex of causes is involved.

1390. ZYCHA, H. Das Rindensterben der Buche. [**Bark disease of Beech.**] *Phytopathologische Zeitschrift, Berlin* 17 (4), 1950/51 (444–61). 14 refs. [G.g.] O.R.S.

New observations on the progress of the disease (necrosis of the bark, spreading into the stem, followed by fungal attack on bark and wood, by secondary fungal and insect attack and often by stem breakage) are described with photographs, and earlier literature is discussed. It is suggested that the disease is caused by extreme climatic factors (e.g. severe drought or cold) rather than by *Cryptococcus fagi* or *Nectria* sp. Careful choice of site may reduce its incidence, and timber loss can be reduced by removing dead trees before they are attacked by fungi. [Cf. *For. Abstr.* 12 (No. 3378).]

5. FOREST MENSURATION. INCREMENT; DEVELOPMENT AND STRUCTURE OF STANDS. SURVEYING AND MAPPING

See also Nos. 933–5.

1391. GRIFFITH, A. L., and PRASAD, J. **The silvicultural research code. Vol. 3. The tree and crop measurement manual.** Manager of Publications, Delhi. 1949 [1952]. pp. viii + 229 + 10 photos + 17 gphs. 27 refs. Price *Rs.*13·6 (21*s.*).

Vol. 2 of the Silvicultural Research Code, published in 1947 [cf. *For. Abstr.* 11 (No. 1561)] covered part of the ground in the old Statistical Code, dealing mainly with statistical theory. Vol. 3, now published, contains chapters on: general rules for measurement of trees; volume tables; conversion factors; enumerations; tree increment plots; stump analysis; stem analysis; increment borings; sample plots (for increment and for thinning research); and compilation of yield tables and stand tables.

1392. PRODAN, M. Aus der Holzmesslehre: ein kritisches Sammelreferat über die neuesten Aufsätze und Arbeiten. [**Forest mensuration: a critical review of recent literature.**] *Forstarchiv* 22 (5/6), 1951 (73–80). 62 refs. [G.]

Covers literature, chiefly of the 1940s, on mensurational instruments, the measurement of felled timber and standing crops, and the calculation of increment and yield.

52. MEASUREMENTS OF STEM DIMENSIONS AND VOLUME OF TREES, STANDS, FORESTS AND TIMBER

521. *Diameter (Girth) and Sectional Area*

See also No. 1402.

1393. Automatická dřevoměrná vidlice. [[**Popcov's] automatic calipers.**] *Čsl. Les* 31 (18), 1951 (405–8). [Cz.]

Describes and illustrates a type of fork caliper, designed in Russia by Popcov (Pushkino Lespromkhoz), having arms 610 mm. long which meet at a pivot. Near the pivot, the arms are linked by two short braces also pivoted both at their attachment to the arms and, centrally, with each other. The central pivot of the braces carries a pencil-holder and moves along the bisector of the angle formed by the caliper arms as they open. Two metal plates —an upper and a lower, each with a central guide slot along which the pencil can move—are mounted rigidly between the caliper arms, and the lower plate carries a recording box with a roll of paper stretched between two drums. On opening the calipers gradually, their arms in contact with the tree, until

the ends of the metal plates stop against the stem, the pencil traces a line whose length is proportional to the diameter. A set of push-button keys stamps a code letter for the chief forest species. The whole caliper weighs 1·5 kg. One man can caliper 8–10 ha. of average forest per day.

1394. BITTERLICH, W. Die Winkelzählprobe. Ein optisches Messverfahren zur raschen Aufnahme besonders gearteter Probeflächen für die Bestimmung der Kreisflächen pro Hektar an stehenden Waldbeständen. **[The *Winkelzahl* method: an optical method of measurement for the quick enumeration of special sample plots, in order to estimate the basal area per ha. in standing crops.]** *Forstwiss. Cbl.* 71 (7/8), 1952 (215–25). 9 refs. [G.g.]

[Cf. *For. Abstr.* 11 (Nos. 2336–7).] Includes a brief description of the 'mirror relascope', an optical instrument designed by the author and produced by the Optimar works, Salzburg, with scales enabling it to be used both for *Winkelzahl* readings and as a hypsometer for direct measurement of height and form height.

522. *Height, Length*

See also No. 1394.

1395. VORÁK. Jednoduchý a praktický výškomer. **[A simple, practical hypsometer.]** *Pol'ana* 7 (10), 1951 (200–1). [Slovak.]

Illustrated description of a hypsometer designed in Slovakia and consisting of a strip of transparent celluloid, 30 cm. long by 2·5–3 cm. wide, having a longitudinal slit [ca. 1 cm. wide] and 2 holes near both ends, the upper for holding the device between two fingers, the lower for attaching a plumb-bob. At distances from the bottom of $\frac{1}{20}$ and $\frac{1}{10}$ of the slit length, there are marks on the celluloid. The measurer moves until the whole length of the tree is exactly framed in the slot and then gets a helper to put a chalk mark on the tree stem in the line of sight of the measurer's eye with the $\frac{1}{10}$ (or $\frac{1}{20}$) mark on the celluloid. The distance from the chalk mark to the foot of the tree multiplied by 10 (or 20) gives the height of the tree.

523. *Bark*

1396. LOETSCH. Über die Abhängigkeit der Kiefernrindenstärke von Durchmesser und Alter. **[The dependence of bark thickness in Scots Pine upon diameter and age.]** *Allg. Forst- u. Jagdztg.* 122 (2), 1950 (58–62). 5 refs. [G.]

524. *Determination of the Volume of Trees and Stands*

524.1. Principles of Volume Determination. Form (Taper)

1397. ZIMMERLE, H. Die Stammform der Weisstanne im Hochwald und Plenterwald und diejenige der Fichte zum Vergleich. **[The stem form of Silver Fir in regular high forest and selection forest, and that of Norway Spruce for comparison.]** *Allg. Forst- u. Jagdztg.* 122 (4), 1951 (107–18). 10 refs. [G.g.]

Re-works existing data for these species in Württemberg, showing that—contrary to expectation—Silver Fir in selection forest has relatively good stem form in addition to remarkably high volume increment. The volume increment of Norway Spruce is considerably inferior both in regular, and still more so in selection, forest.

1398. DUHOVNIKOV, JU. Izučvanija vărhu stăblenata pălnodărvesnost na smărca s ogled na neĭnoto praktičesko opredeljane i izpolzuvaneto i pri kubiraneto na nasaždenijata. **[Investigations on the taper of Spruce with reference to its determination in practice and its use in estimating the stand volume.]** *Sbornik na Centralnija Gorski Izsledovatelski Institut, Sofia* 4, 1948 (1–58). 14 refs. [Bul.russ.f.]

An attempt to elucidate the structure of Spruce stands as regards stem taper, for the more accurate determination of volume and assortments. Three age classes (41–60; 61–80; and 101–120 years) and 3 site qualities are considered. Taper determination was based on the coefficient $q_n = \frac{d_{0.5}}{d_{0.1}}$. The numerical results obtained are tabulated and graphed.

524.2. Volume of Single Trees

1399. SPURR, S. H. **Computing tree volume graphically.** *Minn. For. Notes* No. 8, 1952. pp. 2.

Describes a simple method of computing stem volume without planimetering. Graph paper $8\frac{1}{2} \times 11$ in., ruled in inches and tenths, is used. The long axis represents height at a scale of 10 ft./in. and the short axis represents the square of the diameter (either outside or inside bark as desired) at a scale of 100 sq. in./in. The stem profile is plotted accordingly and smooth curves drawn. The number of squares (by whole square inches and 0·01 sq. in.) inside the curve is counted and multiplied by 4·454 to give the tree volume in cu. ft. The method will apply without change to trees up to 100 ft. high and up to 26·4 in. in basal diameter; it is at least as accurate as any other in common use and much faster than planimetering.

524.3. Volume of Tree Groups and Stands

1400. JOHNSON, F. **Volume tables for Lodgepole Pine in Oregon and Washington, based on diameter, height and form.** Pacific Northwest Forest and Range Experiment Station, Portland. 1952. pp. 32.

1401. KÖHLER, A. Vorratsermittlung in Buchenbeständen nach Stammdurchmesser und Stammabstand : ein Versuch, mit Hilfe eines Näherungsverfahrens den Holzvorrat zu bestimmen. **[Determination of the standing volume of Beech stands from stem diameter and spacing: an attempt to determine growing stock by an approximation method.]** *Allg. Forst- u. Jagdztg.* 123 (3), 1951 (69–74). [G.]

Using data from 18 half-hectare plots in 125- to 140-year-old Beech stands of site qualities III and IV in Waldeck, the author shows that standing volume per ha. can be calculated with a standard error of $\pm 4\%$ (as compared with the volume determined from von Laer's tables) from the formula $V_1 = 0{\cdot}7854 \frac{d^2}{a^3} (2{\cdot}082\, d + 8{\cdot}675\, a - 43{\cdot}076)$, where V_1 is approximate volume/ha., d is mean d.b.h., and a is mean spacing (assumed to be square). A volume

table based on this formula is presented for d = 27–37 cm. (by 0·5-cm. steps) and a = 4·4–9·0 m. (by 0·2-m. steps). In practice it should be sufficient to measure the diameter of 50 trees and their mean spacing. Since spacing is never actually square, it must be expressed as the mean distance from a tree to several of its neighbours, and the mean of the distance to the second- and third-nearest trees is found to be accurate enough for this purpose. The method avoids complete enumeration and height measurement.

1402. CLAUSER, F. Il cavallettamento totale nell'assestamento delle fustaie. **[Total enumeration by calipering in forest management.]** *Ital. for. mont.* 7 (4), 1952 (211–3). [It.]

Discusses the fixing of limits of age and diameter, size of diameter classes, choice of personnel, calipers and organization and execution of the work.

524.4. Recording of Data. Organization of Measuring Parties and Their Work

See No. 1402.

524.6. General Surveys of Forests and Whole Tracts of Forest. Partial Enumeration Surveys, Timber Cruising

1403. HIDE, R. H. **A war-time sampling success.** *Emp. For. Rev.* 31 (3), 1952 (218–24). 4 refs.

Comparison of figures for areas of privately owned woodlands in England and Wales derived from the 1942 census based on map sampling, with the figures from the 1947–9 census based on a 100% field survey, shows an under-estimate of ca. 4·5% in the former. Since the 1942 figures were obtained by 3 men working for only 1 month, it is suggested that future woodland censuses might well employ some map-sampling method such as the intercept method of 1942 (measuring the length of green colouring along the E–W grid lines on the 1-inch Ordnance map) for arriving at total woodland area figures, and then employ a sample field survey to gather sufficient detail for volume, woodland type etc. [Cf. *For. Abstr.* 11 (No. 1518.]

1404. ILVESSALO, Y. **Sampling technique in forest inventories [in Finland].** *Proc. UNSCCUR, Lake Success, 1949* 5, 1951 (2–5). 6 refs.

1405. MATÉRN, B. **Adaptation of modern statistical methods to the estimation of forest areas, timber volumes, growth and drain.** *Proc. UNSCCUR, Lake Success, 1949* 5, 1951 (9–10).

A brief account, based on literature, of Scandinavian methods.

1406. OSBORNE, J. G. **Adaptation of modern statistical methods to forest inventories.** *Proc. UNSCCUR, Lake Success, 1949* 5, 1951 (6–9). 5 refs.

Discusses, on the basis of the U.S. forest survey resumed in 1946, the use of statistical methods in evaluating survey designs, calculating sampling intensity and accuracy, calculating the allocation of funds between photographs and field plots and the allocation of field plots to each stratum, and comparing clusters of plots to individual plots, and the efficiency of temporary and permanent plot systems in relation to costs.

1407. FESTENESSI, J. J. I. **Forest inventory methods in the Chaco Park [Argentina].** *Proc. UNSCCUR, Lake Success, 1949* 5, 1951 (16–9). 6 refs.

1408. NAIR, K. R. **Adaptation of modern statistical methods to the estimation of forest areas, timber volumes, growth and drain.** *Proc. UNSCCUR, Lake Success, 1949* 5, 1951 (11–6). 13 refs.

Describes briefly Indian methods, with appendices describing tests of the accuracy of the standard Indian sample-plot method.

1409. DOMMERGUES, Y. La prospection des peuplements forestiers tropicaux par application des méthodes statistiques. **[The application of statistical methods to enumeration surveys of tropical forests.]** *Bois For. Trop.* No. 23, 1952 (155–70). 22 refs. [F.e.span.]

1410. WARDROP, T. N., and DUFF, C. E. **An account of reconnaissances and stocktaking surveys in tropical deciduous woodlands in a part of Central Africa.** Government Printer, Lusaka, N. Rhodesia. 1952. pp. 21 + 4 forms + 2 photos + 1 map. 5 refs. (6th British Commonwealth Forestry Conference, Canada, 1952.)

This paper gives a non-technical account, written from a practical man's point of view, of forest inventory problems facing a small forest department in an empty part of Central Africa, on the Zambezi-Congo watershed. Three different kinds of forest survey are described—an enumeration survey for mining timber, an extensive reconnaissance for future forest reserves, and the use of air photographs and sampling to settle a question of land use. Descriptions are given of the country and of the methods and organization of the work in each survey. Forms were used which enabled much forest information to be recorded in the field by surveyors who knew very little forestry. *Authors' summary.*

1411. GRIFFITH, A. L. **Statistical methods in forest research: strip enumeration surveys.** East African Agriculture and Forestry Research Organisation, Nairobi. 1952. pp. 12. 9 refs. (6th British Commonwealth Forestry Conference, Canada, 1952.)

Describes the experimental work carried out in forest enumeration surveys, with data from India, the U.S.A. and East Africa. The general conclusions reached are that with a practical goal of an error within $\pm$ 20%, a sampling of 5 to 10% intensity is probably sufficient for all practical purposes under present conditions in tropical forests in as yet undeveloped countries. With regard to the method of sampling, we have the choice of using a systematic strip sample, realizing its dangers and calculating the probable error by methods applicable to random sampling, or of using a stratified random sampling and calculating the actual limits of error. Should stratified random strip sampling not give sufficient coverage for mapping purposes, the difficulty can be overcome by enumerating a few more strips to give the required coverage, but omitting them from calculations. *From author's summary.*

1412. TROTTER, C. L. **A five-acre forest survey at Shades State Park (Indiana). A study of sampling methods.** *Butler Univ. bot. Stud.* 10, Pap. No. 21, 1952 (205–17). 8 refs. A.P.B.

The 5 acres consisted of 143 quadrats of 10 × 10 m., in each of which all woody species (including 27 tree species) were enumerated. Eight (unsystematic) sampling patterns (illustrated) with 3 intensities were chosen to test their relative accuracy. While the 28% and 34% patterns were more representative of the whole than any of the 10% patterns used, it is suggested that in stands of less topographical variation, the results of any 10% sampling pattern might be satisfactorily representative.

525. *Volume by Assortments. Merchantable Volume*

See also Nos. 1201, 1575–6.

1413. GEVORKIANTZ, S. R., and OLSEN, L. P. **Cubic content of sawlogs in standing trees.** *Tech. Note Lake St. For. Exp. Sta.* No. 382, 1952. pp. 1.

A table is given showing the cu. ft. content u.b. of the sawlog portions of trees of d.b.h. ranging from 10 to 40 in. and containing 1–4 sawlogs. If the top utilization is governed by a minimum u.b. diam. of 8 in., the table should apply to the average run of hardwood and softwood commercial timber in the Lake States.

1414. KIMMEY, J. W. **Cull factors for forest-tree species in northwestern California.** *For. Surv. Release Calif. For. Range Exp. Sta.* No. 7, 1950. pp. 30 + 1 map.

The most important cull indicators—fructifications of *Echinodontium tinctorium*, *Fomes pini*, *F. officinalis* and *Polyporus schweinitzii*, fire scars and other butt scars, and dead or broken tops—are described and shown in photographs. Tables are given for the cull % in Douglas Fir, *Abies magnifica* and *A. concolor* per bd. ft. and cu. ft. volume of the sawlog portion of the bole and cu. ft. volume of the entire bole by site and d.b.h. class; the % cull in *Pinus ponderosa*, *P. lambertiana*, and *Libocedrus decurrens* by tree classes; and the % cull for the sawlog portion, entire cordwood trees and entire sawlog trees, of the principal hardwood species of N.W. California.

1415. MALCOLM, R. M.; ALEXANDER, J. L. **An analysis of the difference in gross merchantable cubic-foot volumes of the Upper Fraser uneven-aged Spruce-Balsam type when computed by 2-, 4-, 6-, and 8-inch d.b.h. classes.** *Res. Notes B.C. For. Serv.* No. 21, 1952. pp. 12.

526. *Log Measurement. Scaling*

1416. PENNOCK, J. D., and MORISON, M. B. **Manual of scaling instructions.** Ontario Department of Lands and Forests, Toronto. 3rd ed. (rev.) 1952. pp. 103.

1417. STAEBLER, G. R. **The formula Scribner log rule.** *Res. Notes Pacif. Nthwest. For. Range Exp. Sta.* No. 78, 1952. pp. 6. 1 ref.

Volumes computed for a 1-ft. section of a log from D. Bruce's formula $V = 0{\cdot}625\ (0.79D^2 - 2D - 4)$, where V = volume in bd. ft. and D = diam. u.b. in inches at the small end of the log, are tabulated for logs from 6 to 40 in. diam. by $\frac{1}{10}$-in. classes. Volumes for logs from 8 to 40 ft. long by 1-in. diam. classes, obtained by multiplying the volume of the 1-ft. section by the length of the log in feet, are also given.

53. SPECIAL MEASUREMENTS OF TREES AND STANDS (CROWN DIMENSIONS, STAND DENSITY ETC.)

See No. 1401.

54. ASSESSMENT OF SITE QUALITY

See also No. 939.

1418. KER, J. W. **An evaluation of several methods of estimating site index of immature stands.** *For. Chron.* 28 (3), 1952 (63–74). 6 refs.

The use of height of dominants for the estimation of site index is compared with the use of the average of heights of dominants and co-dominants. It is shown that the use of height of dominants considerably reduces the number of measurements required to determine site index with a given accuracy. Minimum sample sizes are given for 3 limits of accuracy for use in different site qualities. A method for determining minimum sample size in other stands is outlined. The use of diameter in site determination is discussed. Site indices based on the height of the tree of mean diameter, the height of the tree of mean basal area, and mean height are compared. Quick estimates of site quality can best be obtained by the measurement of total height of sample dominant trees selected at random. For this purpose tables are presented listing the average height of dominant trees by age and site classes for use in stands of Douglas Fir and Western Hemlock respectively. *From author's summary.*

1419. HILLS, G. A. **The classification and evaluation of site for forestry.** *Res. Rep. Ont. Dep. Lds. For.* No. 23, 1952. pp. 41.

An amplification of the author's already published system of classifying sites by basic factors. [Cf. *For. Abstr.* 12 (No. 832).]

56. INCREMENT, DEVELOPMENT AND STRUCTURE OF STANDS

See also Nos. 1098, 1123–6, 1130–1, 1134, 1202–4, 1397.

1420. WECK, J. Über die Brauchbarkeit von Wachstumsgesetzen als diagnostisches Hilfsmittel der Waldwachstumskunde. [**The utility of mathematical laws of growth as a diagnostic aid in forest growth studies.**] *Forstwiss. Cbl.* 69 (10), 1950 (584–605). 14 refs. [G.g.]

Briefly reviews some formulae embodying 'growth laws', stressing the distinction between purely empirical formulae and those which attempt to express physiological laws, with special reference to work at Lund University [G. Backmann 'Das Wachstum der Bäume' *Roux Archiv* 41; 'Wachstum und organische Zeit' *Bios, Lpz.* 15, 1943] on formulae of the latter type. Backmann's growth function implies that in a constant environment the logarithm of increment per unit time is negatively proportional to the square of logarithmic time. It can be

deduced that if c.a.i. is plotted against log. time a symmetrical bell curve will be obtained, similar to the Gauss frequency distribution; and that the corresponding summative growth curve will appear as a straight line when plotted against log. time on logarithmic probability paper. On the basis of a number of stem analyses it is shown that these assumptions appear to be justified so long as there is no gross and lasting change in environmental factors, and conversely, that such a change may be recognized by a break in the direction of the line, e.g. after opening the canopy. Analysis of data from Indian and Indonesian yield tables for Sal and Teak revealed no agreement with the law, but agreement was found for Central European yield tables, indicating the probable validity of the law for even-aged stands in this region. It should be possible to take a partial curve of observed data and (*a*) to infer whether or not the environment has been constant for the period represented, and (*b*) if it has, to extrapolate simply by producing the line in both directions, which should give a reliable measure of past and future growth under the assumption of an unchanged environment. Other possible applications are being investigated.

1421. Weck, J. Wachstumsdiagnosen. **[Growth diagnoses.]** *Forstarchiv* 22 (9/10), 1951 (135–8). 4 refs. [G.]

Further develops the theme of the applicability of growth laws to forest trees, with special reference to formulae deduced by Backmann [see preceding abstract] and Bertalanffy ['Theoretische Biologie' II, Berlin 1942], which are of the same general type though not identical.

Assuming once more that the environment is constant, there should be a calculable end point to the growth curve, at least for Central European trees. From Bertalanffy's laws the author develops a growth equation giving a straight-line relationship on semi-logarithmic paper between growth and time, deduces 3 further equations relating the end values and intermediate values to time, and gives practical examples of their use in calculation.

Practical examples of the construction of growth 'curves' on logarithmic probability paper are also included.

It is emphasized that the proper use of such 'curves' is *not* to smooth a set of values, but to reveal in individual cases the relationship of actual, observed values to a standard trend that should be expected in a constant environment, and to indicate the degree and significance of any deviations.

1422. Michajlow, J. [Mihajlov, I. S.] Mathematische Formulierung des Gesetzes für Wachstum und Zuwachs der Waldbäume und Bestände. **[Mathematical formulation of the law of growth and increment of forest trees and stands.]** *Schweiz. Z. Forstw.* 103 (9/10), 1952 (368–80). [G.f.]

Cf. *For. Abstr.* 13 (No. 4097).

1423. Ducay Vela, L. Ensayo sobre la ley matemática de crecimiento de algunas masas forestales. **[The mathematical law of growth of some forest stands.]** [*Bol.*] *Inst. for. Invest. Exp. Madrid* 22 (56), 1951. pp. 71. [Span.]

Presents curves and formulae representing the growth of stands of (1) *Pinus pinaster*, and (2) *P. radiata*, based on data published by I. Echeverría and S. de Pedro. [Cf. *For. Abstr.* 10 (No. 1248); 8 (No. 2165).]

1424. Roe, A. L. **Growth of selectively cut Ponderosa Pine stands in the Upper Columbia Basin [Montana].** *Agric. Handb. U.S. Dep. Agric.* No. 39, 1952. pp. 28. 10 refs.

Cf. *For. Abstr.* 13 (No. 2339).

1425. Spurr, S. H., and Allison, J. H. **Growth of mature Red Pine.** *Minn. For. Notes* No. 9, 1952. pp. 2.

Selected data from sample-plot records extending over 33 years, for stands now nearly 130 years old and of average site index.

561. *Increment in Height, Diameter, Basal Area, Form and Quality. Variations and Trends; Dendrochronology*

1426. Ferguson, J. H. **Diameter increment by diameter classes.** *Tectona* 42 (1/2), 1952 (79–88). 6 refs. [E.]

A comparison of two methods of estimating diameter increment of each diameter class in a forest stand from the number of trees in each class at successive inventories, (1) that of Prodan [cf. *For. Abstr.* 9 (No. 1340)] and (2) the classical French method [cf. *For. Abstr.* 11 (No. 3383)]. Method (2) gives incorrect results in cases where a tree or trees have grown through two or more diameter classes between enumerations, and method (1) is therefore to be preferred.

1427. Young, H. E. **Practical limitations of the dial gauge dendrometer.** *Ecology* 33 (4), 1952 (568–70). 5 refs.

Measurements on 6 Loblolly Pine trees were made, to test the dial gauge as a precision dendrometer. On each tree, 4 measurements were made weekly with a dial gauge to obtain both random and systematic comparisons. Considerable variation in the radial growth at the 4 selected radii were noted on each tree. If the dial-gauge dendrometer is to be used for experimental purposes, it is suggested that several radii be selected at the same height above the ground on each tree, so that the average diameter growth and an estimate of its error can be calculated. It is recommended that the word 'precision' should not be applied to the dial-gauge dendrometer, since it is misleading and tends to give misplaced confidence in an instrument whose precision is limited as adapted for forestry. *From author's summary.*

1428. Samuelson, K.-R. Borrspånslängdförändring. **[Changes in length in increment cores.]** *Skogen* 39 (10*), 1952 (118*). [Sw.]

D.b.h. and the length of cores taken across the diameter from 17 70-year Spruce with d.b.h. ranging from 15 to 20 cm. were measured with calipers. The results show an average difference of $+ 0{\cdot}33 \pm 0{\cdot}60$ mm. A larger-scale investigation with more accurate instruments is necessary, but these preliminary results suggest that no great expansion occurs when the core is removed from the tree and the stresses in the wood are released.

1429. SCHOBER, R. Zum jahreszeitlichen Ablauf des sekundären Dickenwachstums: Untersuchungen im Lehrforstamt Kattenbühl. **[The seasonal course of secondary growth in thickness: studies in the Kattenbühl instructional forest.]** *Allg. Forst- u. Jagdztg.* 122 (3), 1951 (81–96). 23 refs. [G.g.]

Gives the results of observations made at intervals of ca. 14 days throughout the 1949 growing season on Oak, Red Oak [*Quercus borealis*], Beech, Scots Pine, Norway Spruce, Douglas Fir and European and Japanese Larches (5 trees each, in each of two localities at different altitudes) including data on the incidence of the beginning of growth, its culmination, formation of late wood, and cessation, and the dates when 25, 50, 75 and 100% of the year's total diameter growth were attained, together with phenological (leaf development) and meteorological data for comparison. [Cf. *For. Abstr.* 14 (No. 1055).]

The measurements were made on increment cores removed with a specially designed borer having a cutter head (shown in a photograph) which enables the cores to be taken without subjecting them to any mechanical compression, so eliminating the distortion that normally occurs with ordinary increment borers.

1430. JACKSON, L. W. R. **Radial growth of forest trees in the Georgia Piedmont.** *Ecology* 33 (3), 1952 (336–41). 10 refs.

A comparison of the radial growth of 21 species during a single season showed wide variation in the dates of beginning and relative rapidity of growth, duration of most rapid growth, and date when seasonal growth ended. These data are given graphically for *Pinus echinata, P. taeda, P. caribaea, P. palustris, P. ponderosa, Taxodium distichum, Juniperus virginiana, Ulmus alata, U. parvifolia, Cornus florida, Diospyros virginiana, Acer rubrum, Liquidambar styraciflua, Carya tomentosa, Liriodendron tulipifera, Castanea dentata, Fagus grandifolia, Quercus alba, Q. stellata, Q. borealis* and *Q. falcata.*

1431. HUBER, B. Beiträge zur Methodik der Jahrringchronologie. I. Gegenläufigkeitsprozent und Gegenläufigkeitsstruktur als Massstäbe bei der Sicherung jahrringchronologischer Datierungen. **[Methodology in annual-ring chronology. I. Counter-trend per cent. and counter-trend structure [of graphs] as criteria for the fixation of chronological datings based on annual rings.]** *Holzforschung, Berlin* 6 (2), 1952 (33–7). 9 refs. [G.g.e.] P.R.

Owing to a more balanced climate, the annual-ring width of trees in Central Europe fluctuates less than that in Pacific North America; hence the method of coincident minima of ring width, used with success in North America, cannot be used in Europe. It is therefore proposed to develop for European conditions a method of evaluating numerically the similarity or difference of the trends to be compared. The 'counter-trend %' (*Gegenläufigkeitsprozent*), i.e. the total number of years during which the graphs show opposite trends, divided by the total time of observation and expressed in %, is suggested as the measure of similarity. So expressed, the max. dissimilarity becomes 50% and non-synchronous curves approach this value, while for synchronous curves the % becomes the smaller the more uniform the material compared, e.g. it is relatively large for different species, less so for trees of the same species, and still less for various parts of the same tree. It is claimed that the presence or absence of synchronization can be detected by statistical analysis of the average length and the maximum length of the periods of dissimilarity.

562. *Volume Increment*

1432. ABETZ, K. Die Kontrollmethode des Forstbetriebs Karlin in Kaltbrunn. **[The *méthode du contrôle* in the Karlin private forest, Kaltbrunn [central Schwarzwald].]** *Allg. Forst- u. Jagdztg.* 122 (8), 1951 (217–21). [G.]

A critical study of the modified *méthode du contrôle* developed and used since 1932 in this forest—275 ha. of mixed Silver Fir and Norway Spruce with a little Beech—which is owned by two industrialists and is in an advanced stage of conversion from the irregular shelterwood to the selection system. An outstanding feature, the advantages and disadvantages of which are discussed, is that the growing stock is classified according to the standard German log sizes as used in the timber trade, instead of the usual diameter classes. Much of the paper is concerned with the adequacy of the method for the determination and comparison of increment, with suggestions for its improvement in this respect; and an analysis is made of possible reasons (attack by Silver Fir chermes, a series of abnormally dry years, and unsuitable constitution of the growing stock in some of the stands) for a serious drop in increment over the period 1938–48.

58. SURVEYING AND MAPPING (INCLUDING AERIAL SURVEYS)

582. Mapping. Technique of Drawing-Office and Subsequent Work

1433. UNGER, J. L. **Land use and agronomic mapping in Indonesia.** *Tectona* 42 (1/2), 1952 (47–60). 15 refs. [E.]

Discusses and illustrates a series of symbols, for use in maps on a scale of 1 : 50,000, to represent vegetation, land use and occupation, deterioration and conservation, soils, relief, hydrography, communications, buildings and industry, government and public institutions, and boundaries.

585/588. *Aerial Reconnaissance and Survey*

See also Nos. 1388, 1410.

1434. **Report of the committee on aerial survey of forests.** Forestry Commission, London. 1952. pp. 27.

Gives tabulated data (1) by countries in the British Commonwealth, (2) by larger geographic areas, of (*a*) areas photographed, (*b*) areas mapped, (*c*) areas for which volume estimates have been prepared.

1435. BJÖRCKEBAUM, R., and ÖRTENGREN, T. Redogörelse över Norra Skogstaxatorsavdelningens indelningsarbeten år 1950 med flygbilder som underlag. **[An account of survey work by the Northern**

[Swedish] Forest Survey Division during 1950, using air photographs as a basis.] *Norrlands SkogsvFörb. Tidskr.* 1951 (4), (410–34). [Sw.]

1436. SPURR, S. H. **United States experience in the use of air surveys in forest inventory.** *Proc. UNSCCUR, Lake Success, 1949* 5, 1951 (24–7). 5 refs.

An account of methods and equipment.

1437. WELANDER, E. Uppskattning av trädslagsblandning, trädhöjd, slutenhet och kubikmassa med hjälp av flygbilder. [**Estimating mixture of species, tree height, density and volume with the help of air photographs.**] *Norrlands SkogsvFörb. Tidskr.* 1952 (2), (209–41). 14 refs. [Sw.sw.e.]

Results of estimates on the ground and from air photographs for 171 trial plots in N. Sweden and 40 in S. Sweden were compared. The parts by volume of the different species were expressed in tenths for each plot; the standard error (s.e.) in estimating the relative volume of species present was ca. $\pm \frac{2}{10}$ for Pine and Spruce and $\pm \frac{1}{10}$ for hardwoods. The mean height of the stands measured with a stereocomparator gave a mean deviation of 1·2 m. S.e. for stand density measured in tenths from 0·0 for unforested to 1·0 for fully stocked areas was $\pm \frac{1}{10}$. The volume on 100 sample plots covering 54 ha. was estimated at 5240 cu.m. on the ground and 5210 cu.m. from the photographs, with s.e. $\pm$ 26%. Discussion of photographic technique includes figures showing length of shadow for different parts of Sweden at different seasons and times of day.

6. FOREST MANAGEMENT. BUSINESS ECONOMICS OF FORESTRY. ADMINISTRATION AND ORGANIZATION OF FOREST ENTERPRISES

61. FOREST MANAGEMENT: GENERAL, THEORY AND PRINCIPLES

See also Nos. 1699, 1788, 1826.

1438. MEYER, H. A., RECKNAGEL, A. B., and STEVENSON, D. D. **Forest management.** The Ronald Press Co., New York. 1952. pp. xii + 290. Numerous refs. Price $6·00 (£2. 8*s.*).

A textbook intended for forestry students and practising foresters, written from the standpoint of the applicability of management principles to American forestry. Parts I and II deal with general aspects, such as the scope, objects and history of forest management, and the general organization of forest property for management. Parts III and IV, which form the main body of the book, are concerned with forest regulation and management plans and contain chapters on: problems and scope of forest regulation, the normal even-aged forest, the normal uneven-aged forest, methods of regulation of cut, types and forms of management plans, farm woodlands and other small forest properties, management plans for medium and large forests, and the control and revision of management plans.

1439. SCHAEFFER, L. **Selection of silvicultural techniques.** *Proc. UNSCCUR, Lake Success, 1949* 5, 1951 (90–5).

Discusses generally the biological and economic principles that determine selection of management methods.

1440. ORCHARD, C. D. **Status of sustained-yield forest management in Canada.** British Columbia Forest Service. 1952. pp. 21 + map. (6th British Commonwealth Forestry Conference, Canada, 1952.)

1441. THOMSON, A. P. **Problems of sustained-yield management in New Zealand forestry.** New Zealand Forest Service, Wellington. 1952. pp. 19. (6th British Commonwealth Forestry Conference, Canada, 1952.)

1442. WARD, W. C. **Control of utilization in the interests of sustained yield [in New Zealand].** New Zealand Forest Service, Wellington. 1952. pp. 16. (6th British Commonwealth Forestry Conference, Canada, 1952.)

62. WORKING PLANS. ANNUAL OR PERIODIC YIELD. YIELD REGULATION

See also Nos. 1095–6, 1432, 1458, 1474, 1791.

1443. DUSCHEK, A. **Forest management—working plans and their adaptation to changing conditions.** *Proc. UNSCCUR, Lake Success, 1949* 5, 1951 (76–81). 9 refs.

Discusses European methods and technique.

1444. EKLUND, B. **Forest management and working plans [in Sweden] and their adaptation to changing conditions.** *Proc. UNSCCUR, Lake Success, 1949* 5, 1951 (85–8).

1445. CHATURVEDI, M. **Forest management.** *Proc. UNSCCUR, Lake Success, 1949* 5, 1951 (82–5). 5 refs.

Discusses Indian practice. With an appendix: Yield regulations for the Semul [*Bombax malabaricum*] working circle in Tarai and Bhabar Estates Forests, U.P.

1446. Det norske Skogselskaps representantskaps- og årsmøte 1952—med utferder. [**The committee and annual general meetings for 1952 of the Norske Skogselskap, with excursions.**] *Tidsskr. Skogbr.* 60 (9), 1952 (219–26). [Nor.]

Includes a description of a new classification of forests by 'stand [development] classes' (*bestandsklasser*) in place of 'felling classes' [cf. *For. Abstr.* 13 (No. 2358)]. There are 5 main classes: (1) and (2), under regeneration and regenerated respectively, subdivided by treatment needed; (3) a 7–15 m. average-height class, subdivided by b.a./ha.; (4) and (5), both 15 m.-and-over height classes, differing in average diameter and both subdivided by b.a./ha. The method has been used in the Prestebakke forest, and figures are given showing area distribution of the different classes on good, medium and poor site classes.

1447. LOETSCH, F. Zur Methode einer qualitativen Holzvorratsinventur der Kiefer. [[**Suggestions**] **towards a method of qualitative growing-stock**

inventory for Scots Pine.] *Forstarchiv* 21 (10/12), 1950 (127–30). 8 refs. [G.]

Gives definitions of suggested grades of crown and stem quality for the classification of trees for such an inventory.

1448. BRASNETT, N. V. **Organization of sustained yield in previously unmanaged forest.** Forestry Commission, London. 1952. pp. 9. (6th British Commonwealth Forestry Conference, Canada, 1952.)

Management of previously unmanaged forests, which can be assumed to be in a state of dynamic equilibrium, aims at sustained yield from existing growing stock, and at regeneration which will maintain or increase this yield. Production units have to be organized to supply processing plants, and an economic cut per acre must be harvested in a profitable manner. This and technical difficulties often rule out a selection system, and make replacement by uniform stands essential. The most promising method of regeneration should be adopted, and conversion not attempted until the revenue obtainable will pay for it. Area control rarely provides equal annual yields, but volume coupes will do so. A safe estimate of the minimum annual provision on which to plan processing, rather than a statistically precise enumeration, is needed. The estimate can be improved at each revision of the plan from results obtained to date. When adequate numbers of trees below the present economic cutting size exist, it is possible to organize conversion to uniform stands in two felling cycles, and so to harvest some of the increment on these which otherwise is lost. The lengths of the cycles should be in the proportion that the present economic stock bears to the residual volume, plus increment estimated for half the conversion rotation, minus a percentage for felling damage and mortality. The rates used can be approximate, provided they are conservative. Use of two cycles depends on reasonable prospects of an economic cut per acre in the second cycle, but with extraction routes made, and probably higher stumpage values, this may be less than in the first cycle. Sometimes it may be possible to raise the minimum cutting size in the first cycle to increase the yield per acre in the second. Examples of the application of the method and of the yield calculation in two types of forest are given. *Author's summary.*

1449. STOATE, T. N., and BUNNING, C. R. **Control of forest utilisation in the interests of sustained yield in Western Australia.** Government Printer, Perth. 1952. pp. 15 + 3 dgms. 6 refs. (6th British Commonwealth Forestry Conference, Canada, 1952.)

Utilization of timber in the forests of Western Australia is, in the present stage of the State's development, essentially by sawmilling. An important timber industry has been built up, developing an Australian and overseas trade in hardwoods of wide repute. When it became clear that the forests were being overcut, a regulation of cut was introduced, limiting it to a volume estimated approximately to be available in perpetuity. The co-operation of the Timber Industry was sought and obtained. This yield regulation has now operated over a quarter of a century. Emphasis is placed on the importance of log standards in maintenance of the cut. Mention is made of the use of grading rules and improvements in mill design to effect better utilization. Types of mills are given and the main types are described in some detail, while attention is drawn to some of the problems associated with milling the class of log available from the forest. *Authors' summary.*

1450. BRUCE, D. S. **Basal area as a control for partial cutting.** *For. Chron.* 28 (3), 1952 (49–51).

Briefly exemplifies the method of calculating allowable cut from basal area/acre. Also discusses the rival merits of the axe and the paint-gun for marking.

1451. SUSMEL, L. Stato normale (II) e calcolo della ripresa nelle abetine del Comelico. **[The normal state (II) and calculation of yield in the Silver Fir/Spruce stands of the Comelico.]** *Monti e Boschi* 3 (9), 1952 (387–97). [It.f.e.]

Discusses 'normality' in the management of poorer uneven-aged stands, mostly pure Spruce, in the Cadore Alps. The norm is defined as a stand volume of 200 cu.m./ha., increment % of 2, and cutting limit of 45 cm. diameter, corresponding to a mean height of 23 m. [cf. *For. Abstr.* 14 (No. 228)]. For purposes of yield estimation, the growing stock is divided into four size classes: (1) small (20–25 cm. d.b.h.), (2) medium (30–35 and 40 cm. d.b.h.), (3) mature (45 cm. d.b.h.) and (4) over-mature (50 cm. d.b.h. and above), and exploitation is determined by comparing the actual with the ideal distribution of these classes.

1452. VITÉ, J. P. Bestandeslagerbuch oder Bestandeskartei? **[Book versus cards for the stand register?]** *Allg. Forst- u. Jagdztg.* 123 (3), 1951 (87–9). [G.]

Advocates and illustrates the use of simple marginally punched cards, 1 per stand per rotation, to replace register books. The punch holes are used to give the essential data on site and stand constitution, which are completed by a sketchmap and notes on the front of the card, while on the back the necessary details are entered of silvicultural measures, growing stock and fellings.

65. SPECIAL BUSINESS PROBLEMS OF TIMBER-GROWING. CALCULATION OF COSTS AND PROFITABILITY. VALUATION

See also Nos. 1105, 1118, 1168, 1177, 1184, 1194, 1204, 1206, 1274, 1371, 1851.

1453. BECKING, J. H. De economie van een sterke dunning voor de Douglas. **[The economics of heavy thinning for Douglas Fir [in Holland].]** *Ned. Boschb.-Tijdschr.* 24 (10), 1952 (257–69). 4 refs. [Du.e.]

Three sample plots of 0·17 ha. were laid out in a 17-year-old unthinned stand. Thinning grades of 16, 19 and 22% (spacing/top ht.), the first being the most common in forest practice, were used. Results showed that after 2 years top height increment, b.a. increment %, mean diameter increment, and mean height increment were all highest for the

heaviest thinning grade, and that heavy thinning raised the relative productivity, although absolute productivity was not essentially changed. Costs and value are calculated, the net revenue of growth for the 2-year period being estimated at Fl.506, 568, and 730/ha. for the 3 grades respectively. A table and graph are given showing the number of stems per ha. to be left after 19 and 22% thinning for top heights ranging from 8 to 25 m.

1454. Zasada, Z. A. **Does it pay to thin young Aspen?** *J. For.* 50 (10), 1952 (747–8).

Analyses costs and profits from thinning young stands of *Populus tremuloides*.

1455. Mantel, W. Waldbewertung: Einführung und Anleitung. [**Forest valuation: an introduction and guide.**] Verlag B. Schmid'sche Buchhandlung, Augsburg. 1950. pp. 123. 37 refs. [G.] Price *DM*.4·60.

1456. Blume, D. Erleichterung von Waldwertschätzung durch Anwendung von Näherungszahlen? [**Is forest valuation made easier by the use of approximation factors?**] *Forst u. Holz* 7 (10), 1952 (136–8). [G.]

Presents tables for use with Glaser's approximation formula to give, with simple calculations, a reasonable estimate of the value of thinnings and final yield. The figures tabulated are correction factors to be applied to the product of volume and current timber prices per cu.m. for Scots Pine and Norway Spruce, for main crop and thinnings at various ages of stand.

1457. D'Adamo, O. A. **The system of forest valuation [for tax assessment] in Argentina.** *Proc. UNSCCUR, Lake Success, 1949* 5, 1951 (189–93). 3 refs.

Discusses aspects of the present bases for tax assessment in the forest industry, as expressed in decrees of 1945 and 1947. The appropriate market price for each species, the type of product, and the cost of production (including transport) are all taken into consideration in arriving at the net assessment, based on a simple formula. Two factors of great importance are at present excluded: the density of the forest and the diameter of the marketable logs. The data are calculated in terms of sawn timber and it is thus important to know its likely end-use values for any given area. The special economic features of different regions are taken into account by a classification into 'Utilizable Economic Areas'. After the first year of the assessment, revenue almost quadrupled.

The method, combined with some prohibition or restriction in the use of certain species, is claimed to have effectively encouraged more intensive utilization—particularly in the production areas—and prevented squandering of the timber resource. Some of the special physical and economic features of certain regions that require special treatment are described. The author states that the new assessment policy is very similar to the French Equalization Fund (Caisse de Péréquation).

1458. Olberg, A. Über Schätzung und Kennzeichnung des Leistungsvermögens an Wertholz in stehenden Beständen. [**The estimation and specification of the capacity of standing crops to yield high-grade timber.**] *Forstarchiv* 22 (5/6), 1951 (82–5). [G.]

Outlines the author's tentative proposals for a reasonably simple method of estimating the probable capacity to yield high-grade timber. (1) The classification of trees must be directly related to timber prices, and must in particular take account of the sudden drop in price at a certain degree of knottiness. For most species, except Oak (where a further distinction into timber suitable or unsuitable for veneer is desirable), it should be sufficient to distinguish only one class of high-grade timber—viz. all timber above the critical value for knottiness. (2) In older stands that have reached timber size, it is fairly easy to arrive at the number and volume of high-grade trees. It is also possible to estimate for younger stands, even in the thicket stage, the number of trees potentially capable of yielding high-grade timber, especially if it is assumed that pruning can be done. (3) Where yield tables and diameter frequency tables are available for the species concerned, it is easy to calculate the maximum number of such trees in a hypothetical stand at various ages. The figures obtained represent the *minimum* number of such trees necessary at those ages if the maximum yield of high-grade timber is the aim of management. A surplus, decreasing with increasing age of stand, must also be allowed as a reserve for unforeseen contingencies. The final figures obtained can then be used as a standard for comparison of the actual data from different stands, and should assist in deciding how they should be treated and managed.

A few data from the Lehrforstamt Oedelsheim are used in illustration, and a warning is included against setting the minimum length of high-grade timber logs too high when making stand inventories, e.g. for Beech and Scots Pine this limit might be taken as 4 m., and for Oak perhaps as low as 2 m.

66. COSTING OF LOGGING OPERATIONS

See Nos. 1236, 1239–40, 1336, 1371.

68. ADMINISTRATION AND ORGANIZATION OF FOREST ENTERPRISES

681. *National (Federal, State) Forest Services and Administration*

See also Nos. 931, 1824, 1839.

1459. Patrimonio Forestal del Estado—memoria-resumen de los trabajos realizados en el decenio 1940–1949. [**State Forest Service—summarized report of work accomplished between 1940 and 1949.**] Ministerio de Agricultura, Madrid. 1951. pp. 354 + many plates. [Span.]

A lavishly illustrated account of the achievements of the Service during this period.

1460. Hē anadiorganōsis tēs Dasikēs Hypēresias en tō plaisiō tōn Hypēresiōn tou Hypourgeiou Geōrgias. [**The reorganization of the [Greek] Forest Service within the framework of the Department of Agriculture.**] *Dasos* No. 18, 1952 (53–6). [Gk.]

1461. Maung Hman. **Organization of forest services [in Burma].** *Proc. UNSCCUR, Lake Success, 1949* 5, 1951 (199–202). 4 refs.

1462. Loveridge, E. W. **Administration of forests: organization of forest services.** *Proc. UNSCCUR, Lake Success, 1949* 5, 1951 (203–7).

An account of the organization of the U.S. Forest Service.

1463. Borgo Bilia, G. El Servicio Forestal de los Estados Unidos—algunas de sus prácticas y posible aplicación a las condiciones mexicanas. **[The United States Forest Service—some of its practices and their possible application to Mexican conditions.]** Published by the author, Aldama 701, Chihuahua, Chih. 1951. pp. 196. Numerous refs. [Span.]

A comprehensive report on the activities of the U.S. Forest Service, its organization, silvicultural practices and research activities, with brief suggestions for improvements in the Mexican Service.

1464. Romero, S. A., Corothie, H., and Gondelles, A. R. **Forest administration in Venezuela.** *Proc. UNSCCUR, Lake Success, 1949* 5, 1951 (208–10).

686. *Planning and Organization of Buildings, Transport Installations (Roads etc., including Power-line Rights-of-Way*

See also No. 940.

1465. Bruce, M. B. **An access road program for national forests.** *Timberman* 53 (12), 1952 (87 . . . 94).

Estimates the construction of new roads, and their costs, needed to increase felling in U.S. national forests to a sustained-yield capacity within 5 years

7. MARKETING. ECONOMICS OF TRANSPORT AND THE WOOD INDUSTRIES

71. MARKETING OF FOREST PRODUCTS: GENERAL

1466. **Timber in West Africa.** *Stat. econ. Rev.* No. 10, 1952 (1–66 + 21 photos).

Describes the United Africa Group's timber industries in Nigeria and the Gold Coast, with particular reference to logging and transport, conversion (sawmills, plywood mills etc.), export, and economic considerations, and gives some statistics of capital investment.

72. THE QUANTITATIVE ASPECTS OF MARKETING. DEMAND, CONSUMPTION AND SUPPLY

See also Nos. 1805, 1813–5.

1467. VUJIČIĆ, L. Učešće drveta i proizvoda od drveta u našem izvozu i uvozu u I polugodištu 1951 godine. (Statistika spoljne trgovine FNRJ za I polugodište 1951, Beograd, 1951.) **[Part played by wood and wood products in Jugoslav exports and imports during the 1st half of 1951. (Statistics of foreign trade of Jugoslavia in the first half of 1951, Belgrade, 1951).]** *Šumarstvo* 5 (2), 1952 (151–7). [Serb.f.]

1468. OREŠČANIN, D. Izvoz drveta iz NR Srbije 1947–1951. **[Timber exports from Serbia in 1947–51.]** *Šumarstvo* 5 (2), 1952 (144–50). [Serb.f.]

The main items were: Beech pulpwood, Beech structural timber, Oak and softwood structural timber, and railway sleepers.

1469. STAMENKOVIĆ, B. Problemi jamskog drveta. **[Mining timber question in Jugoslavia.]** *Šum. List* 76 (7), 1952 (221–8). [Croat.]

Jugoslavia's average annual production of mining timber in the period 1947–50 was 623,000 cu.m., about one-fifth of which was exported. Slovenia is responsible for over 40% of the total production. About 80% of mining timber was softwood, ca. 10% Oak and Black Locust, and the remainder Beech and other hardwoods. The author analyses the consumption of mining timber in Jugoslavia according to tree species, types of mines and regions of the country, and suggests several ways of reducing consumption, particularly of softwoods.

1470. RITCHIE, J. L. **Wood pulp and pulpwood statistics.** *Fibre Contain.* 37 (8), 1952 (136, 138, 140, 142, 144–8). P.R.

Includes various statistical tables [cf. *For. Abstr.* 12 (No. 2156)] brought up to 1951 inclusive. Total sulphate pulp rose from 6·6% of total pulp consumption in the U.S.A. in 1919 to 52·5% in 1951, the respective % figures for other processes being: total sulphite, 40·2 and 18·6; soda, 9·9 and 2·8, and groundwood, 41·7 and 15·6%. Sources meeting this consumption in 1937 and 1951 respectively were: domestic 72 and 88%, Canadian imports 8 and 9%, and Europe 20 and 3%.

1471. HORN, A. G. **Ten years' pulpwood production in the Lake States (1942–1951).** *Tech. Note Lake St. For. Exp. Sta.* No. 384, 1952. pp. 2.

Results of a survey are shown by states and by species.

1472. **Softwood production in South Australia [: figures for 1950–1].** *Aust. Timb. J.* 18 (6), 1952 (438, 441).

74. TRADE POLICY

See also No. 1449.

1473. **The aims and activities of the T.D.A. with a brief summary of services.** Timber Development Association, London. [1952?] pp. [34].

79. ECONOMICS OF THE WOOD INDUSTRIES

See also No. 1562.

1474. BERTHON, P. Organisation du travail et contrôle de la production et des rendements dans une exploitation forestière et industrielle tropicale. **[Organization of work and control of production and yield in a joint forest and industrial exploitation in the tropics.]** *Bois For. Trop.* Nos. 24; 25, 1952 (260–8; 337–43). [F.e.span.]

Describes in detail the organization of a forest operation in Gabon and the subsequent operations at the sawmill, by a large timber firm. The actual diagrams, forms, stock sheets etc. used, are reproduced.

1475. AUBRÉVILLE, A. La nouvelle industrie forestière de la côte occidentale française d'Afrique. **[The new forest industry of the French West Coast of Africa.]** *Bois For. Trop.* No. 21, 1952 (4–14). [F.e.span.]

Gives an account of the timber industry (particularly sawmills), and the pulp and plywood industries in the French West Coast colonies.

8. FOREST PRODUCTS AND THEIR UTILIZATION

1476. NEUSSER, H. Das österreichische Holzforschungsinstitut in Wien. **[The Austrian Wood Research Institute in Vienna.]** *Mitt. öst. Ges. Holzforsch.* 4 (4), 1952 (11–7). [G.] P.R.

Cf. *For. Abstr.* 13 (p. 119).

1477. KIÆR, H. T. Teknisk og annen forskning i Norge. **[Technical and other research in Norway.]** *Norsk Skogind.* 6 (10), 1952 (300–5). [Nor.e.] P.R.

Outlines very briefly the research fields covered by the Councils for General Research, Agricultural Research and Technical and Scientific Research, and discusses the organization and aims of the last-named, and of the Research Society for Forestry and the Forest Industries. [Cf. *For. Abstr.* 13 (pp. 128–9).]

1478. KOLLMANN, F. Ergebnisse der Holzforschung in Indien seit 1935. **[Results of wood research in India since 1935.]** *Repr.* from *Holz-Zentralblatt, Stuttgart* 78 (6; 8), 1952. pp. 7. 90 refs. [G.] P.R.

A review of research work on wood anatomy, wood physics, strength of wood and wood products,

seasoning, preservation, gluing, and improved wood.

1479. Le domaine forestier et les industries du bois en Afrique du Nord. **[The forests and wood industries of North Africa [Algeria, Morocco and Tunisia].]** *Notes et Études Documentaires, Direction de la Documentation, Paris* No. 1248, 1949. pp. 28. 18 refs. [F.]

81. WOOD AND BARK: STRUCTURE AND PROPERTIES

1480. NAIR, K. R. **Statistical methods in forest products research.** Forest Research Institute, Dehra Dun. 1952. pp. 4. (6th British Commonwealth Forestry Conference, Canada, 1952.)

810. *General Information on Woods*

See also Nos. 1007, 1026, 1028, 1128, 1563.

1481. CHOWDHURY, K. A. **West Bengal commercial timbers (their identification, properties and uses).** *Indian For. Rec.* (*Wood Anatomy*) 1 (3), 1951 (29–96 + 38 photos). Price *Rs.* 3 *as.*6 (5*s.* 6*d.*).

Contains a key for the identification of 26 timbers, a description of each timber, including information on vernacular names, distribution, general properties, gross structure, strength, seasoning, durability, preservation, working qualities, supply and uses, and appendixes showing timbers suitable for various uses, main sources of supply within W. Bengal of the main timbers, and strength data. There are photomicrographs of each timber described.

1482. KRIBS, D. A. **Commercial foreign woods on the American market: a manual to their structure, identification, uses and distribution.** Edwards Brothers, Inc., Ann Arbor, Mich. 1950. pp. iii + 157 + 334 photos. Many refs.

Comprises an illustrated glossary of terms, a descriptive key, a detailed description of over 250 species with photographs of each, a bibliography and an index to the most important common and trade names.

1483. Mahonie. **[Mahogany.]** *Meded. Inst. Trop. Amst.* No. 98 (*Afd. trop. Prod.* No. 38) 1952 (18–20, 65). [Du.e.] L.S.

Describes timbers of *Swietenia*, *Khaya* and *Entandrophragma* spp., with commercial and vernacular names and place of origin, and gives a key (from a French source) for the determination of *Khaya* and *Entandrophragma* timbers.

1484. **Specimen woods Nos. 201–3.** *Suppls.* to *Wood* 17 (9; 10; 11), 1952 (347–8; 389–90; 431–2).

Japanese Maple (*Acer palmatum*); Olivillo (*Aextoxicon punctatum*); Manio (*Podocarpus* spp.).

1485. GERRY, E. **Information leaflet. Foreign woods.** *Rep. U.S. For. Prod. Lab., Madison* Nos. *R*1913; *R*1915, 1951. pp. 10; 5. 51; 11 refs. P.R.

Azobe, Bongossi, or Ekki (*Lophira procera*); Amburana, Cerejeira, Cumarú de Cheiro, or Roble del Norte (*Amburana* spp. = *Torresea* spp.).

1486. **[Colonial timbers.]** *Bois For. Trop.* No. 20, 1951 (251–8); Nos. 21–5, 1952 (27–30; 109–12; 175–8; 256–9; 323–32). [F.]

Aiélé (*Canarium schweinfurthii*); Bossé (*Guarea cedrata*); Iroko (*Chlorophora excelsa*); Grignon franc (*Ocotea rubra*); Tchitola (*Oxystigma oxyphyllum*); Izombé (*Testulea gabonensis*); Wenge (*Millettia laurentii*); and Sipo (*Entandrophragma utile*).

1487. **Timber leaflets.** Forest Products Research Laboratory, Princes Risborough. 1951–2. pp. 2–5 each.

A series of leaflets containing: trade names; information on the tree; a general description of the timber; and information on seasoning properties, wood-bending properties, natural durability, preservative treatment, working properties, and uses of:—Albizzia (*Albizzia* spp.); Avodiré (*Turraeanthus africana* and *T. vignei*); Ayan (*Distemonanthus benthamianus*); Antiaris (*Antiaris africana*); Afzelia (*Afzelia* spp.); Baromalli (*Catostemma* spp.); Celtis (*Celtis* spp.); Curupay (*Piptadenia macrocarpa*); Essia (*Combretodendron africanum*); Lapacho (*Tabebuia* spp.); Maho (*Sterculia pruriens*); Mububa (*Parinari excelsa*); Ogea (*Daniella* spp.); Danta (*Cistanthera papaverifera*); Nyankom (*Tarrietia utilis*); Utile (*Entandrophragma utile*); Makore (*Mimusops heckelii*); Ramin (*Gonystylus* sp.); Agba (*Gossweilerodendron balsamiferum*); Dahoma (*Piptadenia africana*); *Brachystegia* spp., and *Isoberlinia* spp.

1488. SCHMIDT, E. Überseehölzer Nr. 31–32. **[Foreign woods Nos. 31–32.]** *Suppls.* to *Z. Weltforstwirt.* 15 (2), 1952. pp. 4 + 4. [G.] P.R.

Araucaria angustifolia and *Cedrela* spp. [Cf. *For. Abstr.* 13 (No. 3285).]

1489. WALKER, A. Emplois de *Lonchocarpus sericeus* au Gabon. **[Uses of *L. sericeus* in Gabon.]** *Rev. int. Bot. appl. Agric. trop.* 32 (357/358), 1952 (396–7). 2 refs. [F.] P.R.

Uses of the timber include boat-building; the bark is used as a medicine and the seeds and leaves as dyestuffs.

1490. **Timbers of New South Wales: Scented Satinwood [*Ceratopetalum apetalum*].** *Tech. Notes For. Comm.* (*Div. Wood Technol.*) *N.S.W.* 5 (4), 1951 (2–6).

Includes notes on distribution, a brief botanical description, a description of the timber and details of properties and uses.

811. *Structure, Identification*

See also Nos. 1012, 1481–3.

1491. JOHNSTON, D. R. **Structure drawings to 'Specimen woods' sheets 15–17.** *Wood* 17 (9; 10; 11), 1952 (349; 391; 433).

(15) American Red Gum (*Liquidambar styraciflua*), Indian Rosewood (*Dalbergia latifolia*), Mansonia (*Mansonia altissima*) and London Plane (*Platanus acerifolia*); (16) Poplar (*Populus* spp.), Greenheart (*Ocotea rodiaei*), Coachwood (*Ceratopetalum apetalum*), and Robinia (*R. pseudoacacia*); (17) 'Southern Cypress' (*Taxodium distichum*), Blue Gum (*Eucalyptus globulus*), Hornbeam (*Carpinus betulus*), and Stinkwood (*Ocotea bullata*). [Cf. *For. Abstr.* 14 (No. 614).]

1492. Eeckhout, L. E. Twee Kongolese Gymnospermen van belang: *Podocarpus usambarensis* Pilg. en *Podocarpus milanjianus* Rendle. **[Two important gymnosperms from the Congo: *P. usambarensis* and *P. milanjianus*.]** *Meded. Lab. Houttechnol., Gent* No. 11, 1952. pp. 8 + 10 photos. 14 refs. [Flem.f.e.g.]

Gives some notes on the trees and their distribution and describes macroscopic features of the woods and their structure with photomicrographs.

1493. Letouzey, R., and Mouranhe, R. Ekop du Cameroun. **[Hitherto unexploited species from the Cameroons.]** *Publ. Centre tech. for. trop.* No. 4, 1952. pp. 81 + 20 sets of drawings. [F.]

'Ekop' is the name used by the natives and sometimes by timber merchants in the Cameroons, for timber species not yet exploited commercially. The present publication gives brief dendrological accounts of a number of such species together with a more detailed description of the wood anatomy. The following 10 species are dealt with: Ribi (*Berlinia bifoliata*), Gombe (*Didelotia* sp.), Naga (*Brachystegia cynometroides*), Leke (*B. zenkeri*), Nganga (*Cynometra hankei*), Evene (*Brachystegia nzang*), Mayo (*Monopetalanthus* aff. *pellegrini*), Tani and Zing (unidentified: *Cynometra* spp.?), and Beli (*Paraberlinia bifoliolata*). Each species is illustrated by photographs of (1) a tree in leaf, (2) the butt of a growing tree, (3) and (4) photomicrographs of a transverse and a longitudinal section of the wood, and drawings of leaf and fruit.

811.1. Anatomical Elements and Tissues

See also Nos. 1055, 1429–30, 1498.

1494. Bosshard, H. H. Elektronenmikroskopische Untersuchungen im Holzvon *Fraxinus excelsior* L. **[Electron microscopic investigations of wood of *F. excelsior*.]** *Repr.* from *Berichte der Schweizerischen Botanischen Gesellschaft, Bern* 62, 1952 (482–508 + 33 photos). 55 refs. [G.g.] X.

It has been found that the young primary wall of meristematic cells has a tubular texture; during the development of the primary wall, the fibril layers weave through this original texture. Fibrils from the cambial zone and from the phloem are thinner than those from the xylem. The area growth postulated by Frey-Wyssling and Stecher has been found in membranes of the cells of Ash. In the secondary wall many other lamellae have been found inside the known Bailey layers; the fibrils in adjacent layers cross each other.

1495. Shimaji, K. **The relation between fibre length of some dicotyledonous woods and tension on the cambium.** *Journal of the Japanese Forestry Society, Meguro, Tokyo* 32, 1950 (371–2). From *abstr.* in *Rec. Res. Fac. Agric. Univ. Tokyo* No. 1, 1950/51 (1952), (63). [E.]

Examinations were made on fibres of *Cladrastis shikokiana*, *Platyosprion platycarpum*, *Fagus japonica* and *F. crenata* and the factors causing variation in fibre length were considered. It was suggested that tension on the cambium may be the limiting factor for at least part of the tree's life.

811.2. Special Features and Abnormal Structure

1496. Cozzo, D. Estratificación del leño secundario en el género *Cyclolobium* Bentham. **[Storeyed structure in wood of the genus *Cyclolobium*.]** *Rev. argent. Agron.* 19 (3), 1952 (143–6). [Span.e.] E.M.B.

Described in *C. clausseni*—the first record for this genus.

811.4. Growth Rings. Early and Late Wood

See Nos. 1510–1.

811.5. Sapwood and Heartwood

See also Nos. 1533–6.

1497. **Physiology of heartwood formation.** *Rep. For. Prod. Res. Bd., Lond. 1951*, 1952 (9–10 + 2 photos).

The effects produced by experimental girdling [cf. *For. Abstr.* 13 (No. 4174)] are of physiological interest but are disappointing in so far as no widespread increase in the proportion of fully developed heartwood has yet occurred. There is some evidence that the sequence in the transformation of sapwood to heartwood differs in Oak and Larch. In a supplementary experiment a bark girdle was cut at the top of the bole as well as the main girdle at the base to prevent replenishment from the crown of food reserves in the trunk. This caused a much more marked fall in the starch content of the trunk but appears to prevent callus formation. This, with other evidence [not given] indicates that callus formation, on which this experimental technique depends, is governed by substances derived from the active leafy crown and that these are not ordinary food substances like starch and sugar.

1498. **Structure in regard to properties. (1) Sapwood-heartwood.** *Rep. Commonw. sci. industr. Organ. Aust. 1949/50*, 1951 (79).

Investigations of a number of trees with a narrow sapwood and coloured heartwood have shown that the ray cells contain substances in solution in the cell sap, which are absent from the other living cells of the sapwood. In many woods these substances are tannins. By special techniques [not specified] it has been shown that in species of *Eucalyptus*, *Nothofagus*, *Acacia*, and many other genera, the tannins are in solution in the cell sap as long as the ray cells remain alive, and that some time before the ray cells die there is increased metabolic activity which results in the growth of tyloses, secretion of kino and increased tannin production. On the death of the ray cells, the permeability of the protoplasmic membrane alters and the tannins are set free to permeate the whole of the wood. On contact with the air—as the dead timber dries—they harden and become coloured, giving the heartwood its colour and increased durability, and rendering it difficult to penetrate with preservatives. Tannins were not found in the sapwood of the trees investigated. The nature of the stimulus that causes first increased activity and finally death of the ray cells is being investigated. In some trees death has been shown

to be caused by fungal attack; in others it appears to be of dual origin, initially by injury or fungal attack, but afterwards through the toxic action of the released tannins. In some trees the ray cells live much longer than would be expected. In a Myrtle Beech [*Nothofagus cunninghammi*] in which the annual growth rings are distinct enough to be counted, living ray cells were found in the 110th ring; in rings nearer the centre of the tree they had been killed by fungal attack.

1499. Hirai, S. **The early stage of the transformation of sapwood of Japanese Larch into heartwood.** *Res. Bull. exp. For. Hokkaido Univ.* 15 (2), 1952 (239–53). 7 refs. [Jap.e.]

Stem analyses with disks 0·1 m. apart from 6- to 7-year *Larix leptolepis* indicate that transformation of sapwood begins at a point about 0·2–0·5 m. above the ground when stem diameter reaches ca. 1 cm. at 0·3 m. and the tree is 5–6 years old. Empirical formulae for the heartwood/sapwood ratio at different ages and stem diameters [cf. *For. Abstr.* 12 (No. 364)] give results in reasonable agreement with the observed data. Heartwood formation varies more with individual trees than with growth conditions. In older trees, the proportion of heartwood is highest at the point of origin and decreases with distance up or down from this point. The sample trees contained no heartwood but the transition zone already existed. *From author's summary.*

811.6. Texture. Grain. Figure

See also Nos. 1510, 1513.

1500. Baumer, L. À propos des figures du bois. **[Figure in wood.]** *Bois For. Trop.* No. 24, 1952 (233–55). [F.]

Defines the difference between grain, figure and texture in wood; describes various types of grain and of figure (both structural and resulting from sawing) in general, and then gives specific examples. Finally presents a glossary of terms used in French, German, English, Flemish and Dutch.

811.7. *Phloem. Bark*

See Nos. 974–5, 1688.

812. *Physical and Mechanical Properties*

1501. Pillow, M. Y. **Some characteristics of young plantation-grown Red Pine in relation to properties of the wood.** *J. For. Prod. Res. Soc.* 2 (1), 1952 (25–31). 7 refs. P.R.

Results of determinations made on 54 trees 14–37 years old, of the dominant, co-dominant and intermediate classes. These had wood of lower sp. gr. than older trees from natural stands and their longitudinal shrinkage often much exceeded the usual figure of 0·1–0·3%. Mutual relationships of sp. gr. and longitudinal shrinkage to strength in compression along the grain were also determined.

812.1. Optical, Acoustic, Frictional, Thermal and Electrical Properties

See also No. 1504.

1502. Nambiyaar, V. P. N. **Russel effect in Indian timber woods.** *Indian For.* 78 (10), 1952 (490–6 + 47 photos). 7 refs.

The photographic activity of 40 Indian timbers (sapwood) has been measured and is expressed in a scale relative to that of Teak. Exposure to sunlight and ultra-violet light gave increased activity. Extraction of resins with benzene alcohol diminished activity. The data are tabulated, and Russel images are presented for each species. [Cf. *For. Abstr.* 13 (Nos. 3309–10).]

1503. **Electrical properties of wood.** *Rep. For. Prod. Res. Bd., Lond. 1951*, 1952 (51–3). 1 ref.

(1) The effect of moisture content, grain direction and frequency on dielectric constant and loss tangent have been studied for Quipo, [*Cavanillesia platanifolia*], Western Red Cedar, Sitka Spruce, *Cupressus* sp., Sycamore, Sweet Chestnut, Douglas Fir, European Larch, Oak and Ash, Karri [*Eucalyptus diversicolor*] and Wallaba [*Eperua* sp.]. Some of the loss-tangent/frequency curves show indications of a maximum at a frequency of about 20 megacycles/sec., maxima which had been reported by other workers but not previously observed at the laboratory; their occurrence seems to be limited to very dry wood of certain species only. Results, shown in graphs, indicate that: (*a*) dielectric constant is roughly proportional to density; (*b*) dielectric constant varies regularly though not linearly with m.c. and frequency; (*c*) there is no evidence that loss tangent is related to density; and (*d*) the nature of the variation of the loss tangent with m.c. depends markedly on the frequency. The experimental errors in measuring loss tangent are much higher and its values less predictable than those for dielectric constant [cf. *For. Abstr.* 13 (No. 4178)]. (2) Some experiments have been made on the production of changes in wood by stress, in an attempt to verify a claim [Bashenov, V. A., and Konstantinova, V. P., *Dokl. Akad. Nauk SSSR* 71, 1950 (283)] that dry wood cut at an angle to the grain shows piezo-electric effects. No changes attributable to these effects were observed in wood and it is concluded that the effects, if they exist at all in wood, are extremely small.

812.2. Behaviour with Liquids and Gases. Moisture Relations etc.

See also Nos. 1512, 1595–6, 1676–7.

1504. Ogura, T., and Onuma, K. **The calculation of moisture distribution in wood by electrical resistance.** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 53, 1952 (83–101). 7 refs. [Jap.e.]

A study of the effects of electromotive force, moisture content, temperature and electrode distance on readings.

1505. Carruthers, J. F. S., and Lacey, P. M. C. **The [Princes] Risborough Platen-oven: a machine for rapid moisture content determinations upon veneers.** *Wood* 17 (11), 1952 (420–3). 1 ref.

The Platen-oven is used to assess the moisture content (m.c.) of veneers. It consists essentially of two 8-in. square platens, heated to a high temperature, between which the test piece is flattened and dried. The veneer when placed in the machine falls between the platens, a toggle controlling the position of the moving platens is straightened by pulling the

operating handle, and the moving platen presses the veneer sample against the other spring-loaded platen. An electrical timing device lights an indicator at the end of a predetermined time, the platens are then opened by pushing back the handle and the sample drops down a chute into the collecting box. Paper work is saved by writing the weights and reference numbers on the samples themselves. The platens are heated by passing a large current at low voltage (1000 amps, 2½ volts) through a metal sheet attached to, but electrically insulated from, the back of each platen. The current, derived from a built-in transformer, is controlled by a bi-metal thermostat to give a platen temperature of 200° ± 1° C. (392° F.), a temperature below that at which veneer becomes scorched. The m.c. of matched pairs of samples of 9 species of veneer was determined by the standard method and by the Platen-oven method. Results showing the difference between moisture contents obtained by the different methods are shown in graphs. For the slowest drying species tested, m.c.s agreed with those found by conventional oven-drying to within 1% after 60 sec. in the machine for 0·064-in., and 150 sec. for 0·127-in. veneer. Only 5 sec. was needed to drive off all moisture from 0·032-in. veneer. No great error occurs if samples are left in longer; a 0·064 veneer can be left in for up to 6 min. without the error in m.c. exceeding −1%. A graph is given showing relation between thickness and time for any m.c. up to 20%. Systematic tests over several months have shown that performance is consistent. Construction, initial cost, electrical load, rate of working, and time for a single estimation are compared for the Naiad [cf. *For. Abstr.* 13 (No. 2416)] and the Platen-oven. The oven is not obtainable commercially, nor is it covered by patents, but the prototype can be examined at the Forest Products Research Laboratory on application to the Director.

812.3. Density. Specific Gravity. Buoyancy

See also No. 1269.

1506. WELLWOOD, R. W. **The effect of several variables on the specific gravity of second-growth Douglas Fir.** *For. Chron.* 28 (3), 1952 (34–42). 10 refs. (Research Paper No. 2, Faculty of Forestry, University of British Columbia.)

Samples were taken at 3 levels in the stem (base, one-third total height, and merchantable top) from trees of 3 crown classes (dominant, co-dominant, and intermediate) representing site indices from 93 to 160. It was established that wood at the base of the tree was denser than that at higher levels, but not significantly so on better sites. At the same levels, dominants had significantly lower sp. gr. values than either co-dominants or intermediates; there was no significant difference between the two latter. 'Good' sites gave significantly lower sp. gr. than 'average' sites. [Cf. *For. Abstr.* 12 (No. 3013).]

1507. MACGREGOR, W. D. **Sitka Spruce—density survey project. Progress report 1.** Forest Products Research Laboratory, Princes Risborough. 1952. pp. 6.

Presents results of measurements of oven-dry weight/green-volume (d) made on 69 discs taken at various levels from 39 trees in three sample plots in Wales. The mean values show little variation between plots, but the range within plots is appreciable (from 0·242 to 0·382 d). It appears that the oldest plot has the highest and the youngest plot the lowest d. There is a definite drop in d in proceeding from 1 ft. to 22 ft. up the bole of the tree. Poor correlation has been found between d and annual-ring width, better correlation between d and ring types (in terms of summerwood).

812.7. Strength Properties

See also Nos. 1540–1, 1551, 1581–3, 1589–90, 1593–4, 1603, 1647–8, 1695.

1508. LIMAYE, V. D. **Strength of Bamboo (*Dendrocalamus strictus*).** *Indian For.* 78 (11), 1952 (558–75).

Tests were made at Dehra Dun on ca. 1000 specimens of *D. strictus* from the New Forest area. The data were statistically analysed and are tabulated and discussed in detail. Strength data are also given for *Bambusa balcooa*, *B. nutans*, *B. tulda* and (for purposes of comparison) of *Tectona grandis* and *Shorea robusta*.

1509. **Elastic properties of wood.** *Rep. For. Prod. Res. Bd., Lond. 1951*, 1952 (53).

Results of measurements of the effect of temperature on the shear moduli in the radial-tangential (RT), tangential-longitudinal (TL), and the radial-longitudinal (RL) planes show more scatter for Oak than for Beech [cf. *For. Abstr.* 13 (No. 4197)], but satisfactory estimates of changes in shear moduli with temperature can nevertheless be made. The mean temperature coefficients between 40° and 100° C. for both Oak and Beech are shown plotted against the relative humidity at which they were measured. There is no difference between the behaviour of the two species, nor between the coefficients in the TL and RL planes; the coefficient in the RT plane is higher at all humidities than in the other two planes and all the coefficients increase rapidly with increasing humidity. There is some evidence that at humidities of 90% and over, the relation between shear moduli and temperature for Oak is not linear, but is curved in such a way that the shear moduli decrease more rapidly with temperature as the temperature increases. This effect is not, however, shown by any of the Beech results, nor by the Oak results below 90% humidity. (2) The deflections of plates of Afara, Gaboon and Maple plywoods cut at various angles to the grain and subjected either to pure bending or to pure twisting loads have been measured; results verified the prediction that the resultant distortion is, in either case, a combination of bending and twisting deflection; predicted and observed deflections agreed very closely.

1510. MAYER-WEGELIN, H. Der Härtetaster: ein neues Gerät zur Untersuchung von Jahrringbau und Holzgefüge. **[The 'hardness feeler': a new instrument for investigating annual-ring structure and**

the texture of wood.] *Allg. Forst- u. Jagdztg.* 122 (1), 1950 (12–23). 7 refs. [G.]

The essential feature of this instrument, which is shown in a photograph, is that hardness is measured as the depth of penetration by a thin steel needle (a standard very fine gramophone needle was used) to which a constant load is applied via a plunger rod and spring, mounted in a cylindrical housing. The needle passes through a steel foot cut away on one side so that the point of entry into the wood can be observed with a slanted binocular microscope. To minimize elasticity of the needle, it is fixed in a small steel cylinder with only enough point protruding to allow proper penetration of the softest wood (4·14 mm. in Balsa). On top of the housing is mounted a micrometer dial, also actuated by the plunger rod, giving penetration readings correct to $\frac{1}{100}$ mm. A device is provided for lifting the needle out of action as required. For adjustment, the instrument is placed on a sheet of glass, the needle released so that it presses against the glass, and the micrometer then set at zero. The whole of this mechanism is carried on a horizontal slide-rail along which it can be moved by means of a micrometer screw reading correct to $\frac{1}{100}$ mm., and the slide-rail hinges vertically on the central column of a heavy base-plate with 3 spikes on its bottom to secure a good grip. Stability, and as little play as possible, are essential.

In operation, tests can be made at intervals the minimum limit of which is set only by the need to avoid overlapping of the preceding penetration hole, i.e. by the needle diameter flush with the surface at full penetration. This interval proved to be ca. 0·25 mm. for hard and 0·50 for soft woods. It is thus possible to make rapid, successive tests practically continuously across the early- and late-wood tissues within a series of growth rings.

Specimen graphs are included for such tests, showing the characteristic patterns obtained for 19 species (coniferous and deciduous), followed by sections on: the influence of tissue structure; lateral slip of the needle and the spacing of successive tests; influence of moisture content; comparative penetration in cross-sectional, radial and tangential surfaces; hardness grades compared with those given by the usual ball tests; correlation with density; determination of late wood and the late-/early-wood boundary in diffuse- and ring-porous hardwoods and in conifer woods; and some applications, e.g. determining effects of decay and of seasoning, comparison of normal and abnormal wood, variation of hardness with position in stem, influence of ring breadth on working properties.

1511. Ohsawa, M., and Miyajima, H. **Hardness tests on 8 species of broadleaved trees in Hokkaido.** *Res. Bull. exp. For. Hokkaido Univ.* 15 (2), 1952 (263–301). 20 refs. [Jap.e.]

Tests were made by the Brinell method. In order to reduce experimental errors, the maximum load, not causing creep of the ball indentation, was used; in this study creep generally appeared when the depth of the ball indentation was about 0·4–0·5 mm. In the diffuse-porous woods tested (*Cercidiphyllum japonicum, Prunus serrulata, Micromeles japonica, Acer pictum, A. palmatum* and *Ostrya japonica*) the effect of the number of rings per cm. on hardness was not clear; in the ring-porous woods (*Ulmus japonica* and *U. laciniata*) the hardness number decreased with closer rings. The hardness number of all species increased gradually with increasing sp. gr. and decreased rapidly with increasing moisture content. In all species the ratio of the hardness number of the end surface to that of the side surface was about 0·3 to 0·4. In the diffuse-porous woods the hardness number of the tangential surface was about 20–30% above that of the radial surface; in ring-porous woods no difference was found between the two surfaces. *From authors' summary.*

1512. Curry, W. T. **The effect of moisture content on the tensile strength of Sitka Spruce.** *Repr. from Aircr. Engng.* 24 (279), 1952 (142–3). 1 ref.

Presents results of tensile-strength measurements made on specimens cut from 11 baulks of aircraft-quality Sitka Spruce (DTD 36B), the density ranging from 22 to 34 lb./cu. ft., at moisture contents of 9, 12, 15, and 20%, and at saturation. On the average, a change in moisture content (m.c.) within the range 9–20% had no significant effect on tensile strength, but an increase in m.c. to saturation significantly reduced it. The tensile strength for material below 20% m.c. averaged 18,730 lb./sq. in., and at saturation 14,750 lb. The effect of moisture on the strength varies with density. A method is suggested for determining the tensile strength with reasonable accuracy for a given density and m.c.

812.8. Workability. Working Properties

1513. Hyler, J. E. **Characteristics of tough woods.** *Sth. Lumberm.* 185 (2313), 1952 (47 . . . 52).

Discusses the working properties of woods with interlocked fibre.

813. *Wood Chemistry*

See also Nos. 1696 *et seq.*

1514. Pentegova, V. A. Himičeskiĭ sostav drevesiny sibirskogo kedra. **[Chemical composition of the wood of *Pinus sibirica*.]** *Žurnal Prikladnoĭ Himii, Moskva* 23 (9), 1950 (998–1000). 6 refs. [Russ.] D.S.I.R.

Tabulates the results of chemical analysis (7 trees, totalling 25 complete analyses) of sapwood (*s*), heartwood (*h*), butt end, top, and mid-stem portions of *P. sibirica* from two sites in Siberia. Determinations were made of alcohol/benzene solubles, hot-water solubles, cellulose, lignin, pentosans, mannan, galactan, ash, and N. The butt portion contains the largest and the mid-stem the lowest % of alcohol/benzene solubles; *s* at all levels contains less than *h*. The content of water-solubles increases steadily from butt to top. The cellulose content is slightly lower at the top than elsewhere and is much higher in *s* than in *h*. The lignin content increases from butt to top and is lower in *s* than in *h*. Pentosan and mannan contents are highest in the butt and lowest near mid-stem; *s* contains less pentosan and more mannan than *h*. Galactan content is highest at the top; *s* contains less than *h*.

813.1. Chief Organic Constituents. Constituents of the Cell Wall

1515. Senzyu, R. Eine neue Bestimmungsmethode des Lignin in Hölzern und Zellstoffen durch Kolloidtitration. [**A new method of determining the lignin in wood and pulp by colloid titration.**] *Proceedings of the Japan Academy, Tokyo* 28 (6), 1952 (300–4). [G.] O.R.S.

1516. Adler, E., and Lindgren, B. O. **Some aspects on lignin structure.** *Svensk PappTidn.* 55 (16½), 1952 (563–75). 75 refs. [E.] P.R.

A review of progress.

1517. Schuerch, C. **The solvent properties of liquids and their relation to the solubility, swelling, isolation and fractionation of lignin.** *J. Amer. chem. Soc.* 74 (20), 1952 (5061–7). 32 refs. O.R.S.

The ability of solvents to dissolve or swell a variety of isolated lignins increases as the H-bonding capacities of the solvents increase and as their solubility parameters approach a value of 11. Lignin fractions of lower molecular weight are soluble in solvents with a wider range of solubility parameter and H-bonding capacity than are the higher fractions. Earlier fractionations of ethanol and hydrol lignins are applications of this fact. Solubility trends in mixed solvents and within a homologous series of solvents are correlated with the same solvent properties. The yield of ethanol Spruce lignin is substantially increased when the reaction is carried out in a better solvent system such as chloroform-ethanol. A threefold ethanolysis under mild conditions of acidity and temperature in this solvent mixture has given rise to a variety of products with widely different partition coefficients, solubilities and viscosities. The insolubility of lignin in wood and the heterogeneity and low molecular weight of its degradation products suggests the probability of a network structure or structures for lignin. *From author's summary.*

1518. Wacek, A., and Hlava, J. Vergleichende Untersuchungen an den mit Wasser fällbaren Anteilen von Organosolvligninen der europäischen Fichte. [**Comparative studies on 'organosolvlignin' fractions of European Spruce which are precipitable by water.**] *Monatshefte für Chemie und verwandte Teile anderer Wissenschaften, Wien* 82, 1951 (1046–58). 32 refs. [G.] D.S.I.R.

Lignins (yield ca. 10%) were obtained by extracting wood with 50/50 mixtures of water and methanol, ethanol, acetone, dioxane, and methyl-ethyl ketone. The methoxyl values in the respective lignins were: 17·47; 16·31; 14·5; 15·44; 14·08%; the active H contents were 0·67; 0·65; 0·74; 0·80; 0·71%; and the contents of –CO– were 3·47; 3·57; 5·93; 6·28, and 5·66%, respectively. It was observed that lignin so obtained (e.g. acetone lignin), when treated with a 50/50 mixture of ethanol and water, gave the same final product as that obtained by direct treatment of wood with this mixture.

1519. Aulin-Erdtman, G. **Spectrographic contributions to lignin chemistry. II. Preliminary report.** *Svensk PappTidn.* 55 (19), 1952 (745–9). 9 refs. [E.e.] P.R.

Results of extensive ultra-violet absorption studies on various soluble derivatives of Spruce lignin, on 'native' lignin from *Picea mariana* and *Tsuga heterophylla*, on the dehydrogenation polymerization product of coniferyl alcohol and on low molecular model substances, are tabulated and discussed.

1520. Hägglund, E., and Richtzenhain, H. **Comparative investigations on native and isolated lignin.** *Tappi* 35 (6), 1952 (281–4). P.R.

Presents results of alcoholysis (with C_2H_5OH) and sulphonation of both wood and carefully prepared HCl-lignin; the effect of methylation on the course of the above reactions has also been studied.

1521. Freudenberg, K. Die Entstehung des Lignins in der Pflanze. [**Formation of lignin in plants.**] *Holzforschung, Berlin* 6 (2), 1952 (37–42). [G.g.e.] P.R.

A general survey of research work on lignin, with particular reference to the author's recent investigations.

1522. Freudenberg, K. Die Entstehung des Lignins in der Pflanze. [**Formation of lignin in plants.**] *Holz Roh- u. Werkstoff* 10 (9), 1952 (339–41). [G.g.] P.R.

Neutral solvents can extract from softwood at 20° C. a small amount of lignin, while a larger amount can be extracted by dioxane containing some HCl. The chemical composition and behaviour of this lignin is very similar to that of the synthetic (artificial) lignin obtained from coniferyl alcohol in aqueous solution at pH 6 and 20° C. in the presence of a phenol redoxase from mushrooms. It has been established that the redoxases of the cambial zone can produce the same synthetic lignin. In the cambial zone of softwoods the glucoside coniferin is present, resistant to the action of redoxases. It is only after the liberation of the coniferyl alcohol that the latter can be transformed into lignin. It has been found that a coniferin-separating glucosidase is present exactly in the place where lignification occurs, and that the coniferyl alcohol formed is changed into lignin by the redoxases. The insoluble lignin is deposited in the cell wall, thus completing the process of lignification. [Cf. *For. Abstr.* 14 (No. 656).] *From author's summary.*

1523. Nord, F. F., and Stevens, G. de. **On the mechanism of lignification.** *Naturwissenschaften* 39 (20), 1952 (479–80). 10 refs. [E.] O.R.S

Evidence is quoted for the following statement on the mechanism of lignification; carbohydrates are enzymatically transformed through a C_2 fragment to a *p*-hydroxyphenylpropane unit. This primary lignin progenitor can then undergo methoxylation to give a guiacyl unit. These two aromatic building stones in turn could form lignin by repeated condensations.

1524. Leopold, B. **Studies on lignin. XIV. The composition of Douglas Fir wood digested by the West Indian dry-wood termite (*Cryptotermes brevis* Walker).** *Svensk PappTidn.* 55 (20), 1952 (784–6). 10 refs. [E.e.] P.R.

Excrement of *C. brevis* fed on Douglas Fir was analysed and subjected to sulphonation and nitrobenzene-alkali oxidation. Results of the analysis are compared with those for Spruce attacked by the fungus *Coniophora puteana* for 8 months, and the content of Klason lignin is shown to be roughly the same for both. Most of the carbohydrates were assimilated by the termite, leaving most of the lignin relatively unchanged. Yields of vanillin were almost as high as from fresh wood.

1525. Traynard, P., and Robert A. Extraction de la lignine du peuplier par l'acide nitrique. **[Extracting lignin from Poplar by nitric acid.]** *Bull. Soc. chim. Fr.* 19 (7/8), 1952 (746–50). 11 refs. [F.f.] O.R.S.

Poplar wood was treated with acetic acid and kept at 30° C. for 4 days, during which period HNO_3 was added at intervals. A crystalline nitrolignin was obtained. Details of its physical and chemical properties are given and a formula is suggested.

1526. Campbell, W. G., and McDonald, I. R. C. **The chemistry of the wood cell wall. Part II. The isolation of Beech and Spruce acid-soluble and modified lignins.** *J. chem. Soc.* Aug., 1952 (3180–3). [Forest Products Research Laboratory, Princes Risborough.] O.R.S.

From the H_2SO_4 lignin hydrolysates of Beech and Spruce woods, Beech and Spruce acid-soluble lignins (7·4% and 5·8% on an original oven-dry wood basis respectively) have been isolated by a new method, involving passage through an ion-exchange column. Similarly Beech and Spruce modified lignins (5% and 6·1% respectively) have been prepared from the H_2SO_4 lignin hydrolysates of the corresponding holocelluloses. Therefore the total lignin content of Beech or Spruce woods or of their holocelluloses cannot be determined by the 72% H_2SO_4 method. The methoxyl and C contents of these substances are considerably lower than those of the H_2SO_4 lignins from the same woods. [Cf. *For. Abstr.* 14 (No. 655).]

1527. McDonald, I. R. C. **The chemistry of the wood cell wall. Part III. The isolation of Beech hemicellulose A.** *J. chem. Soc.* Aug., 1952 (3183–6). [Forest Products Research Laboratory, Princes Risborough.] O.R.S.

Beech hemicellulose A, obtained in a yield of 8·2% without first delignifying the wood, was substantially free from H_2SO_4 lignin and acid-soluble lignin and had a total polysaccharide content of 91·1% (expressed as xylose). The method used involved extraction of the wood with alcohol/benzene, extraction of the extractive-free wood with aqueous NaOH, and precipitation of the hemicellulose with acetic acid. Figures for the analyses of the extractive-free wood, the alkali-extracted wood and hemicellulose A are tabulated.

1528. Jones, J. K. N., and Wise, L. E. **The hemicelluloses present in Aspen wood (*Populus tremuloides*). Part II.** *J. chem. Soc.* Sept., 1952 (3389–93). 1 ref. [Institute of Paper Chemistry, Appleton, Wis.] O.R.S.

Fractionation of the uronic acids produced on hydrolysis of Aspen sawdust has yielded D-galacturonic acid and 2-α-(4-methyl D-glucuronosyl) α-D-xylose as well as several unidentified acidic fractions of higher molecular weight. *Authors' summary.* [Cf. *For. Abstr.* 14 (No. 667).]

1529. Wethern, J. D. **Some molecular properties of the hemicelluloses of Black Spruce.** *Tappi* 35 (6), 1952 (267–71). 21 refs. P.R.

Presents results of studies on the molecular size and chemical homogeneity of representative samples of hemicelluloses obtained from *Picea mariana* by a chlorine-ethanolamine process. Molecular-weight measurements were conducted with the butyrate esters of the hemicelluloses. The average molecular weight of the isolated hemicelluloses, determined by osmotic-pressure measurements of their derivatives, was ca. 20,000 (equivalent to a degree of polymerization of 150 calculated as pentosans or 120 calculated as hexosans). Various fractions of hemicelluloses had pentosan contents ranging from 30 to 57%.

813.2. Minor Organic Constituents. Extractives. Cell Contents

See also Nos. 1498, 1502, 1785–6.

1530. **Deposit in a dipterocarp.** *Rep. For. Prod. Res. Bd., Lond. 1951*, 1952 (46).

A white wax-like solid which appeared to contain an oil in admixture, was removed from a shake in the heartwood of a dipterocarp, and studied. Results are discussed. There is some evidence that the substance may be a previously unknown triterpenoid alcohol.

1531. **[Extractives of *Baikiaea plurijuga*, Muave [*Erythrophleum* sp.] and *Mimusops heckelii*.]** *Rep. For. Prod. Res. Bd., Lond. 1951*, 1952 (45–6).

Cf. *For. Abstr.* 13 (No. 4221).

1532. King, F. E., and Jurd, L. **The chemistry of extractives from hardwoods. Part VIII. The isolation of 5 : 4′-dihydroxy-7-methoxy*iso*flavone (prunetin) from the heartwood of *Pterocarpus angolensis* and a synthesis of 7 : 4′-dihydroxy-5 methoxy*iso*flavone hitherto known as prunusetin.** *J. chem. Soc.* Aug., 1952 (3211–5). O.R.S.

Cf. *For. Abstr.* 14 (No. 670).

1533. Carlsson, B., Erdtman, H., Frank, A., and Harvey, W. E. **The chemistry of the natural order Cupressales. VIII. Heartwood constituents of *Chamaecyparis nootkatensis*—carvacrol, nootkatin and chamic acid.** [A continuation of the series: Antibiotic substances from the heartwood of *Thuja plicata*.] *Acta. chem. scand.* 6 (5), 1952 (690–6). 17 refs. [E.e.] O.R.S.

Cf. *For. Abstr.* 13 (No. 3342).

1534. Lindstedt, G., and Misiorny, A. **Constituents of Pine heartwood. XXVIII. Investigation of four additional *Pinus* species by paper partition chromatography.** *Acta chem. scand.* 6 (5), 1952 (744–6). 4 refs. [E.e.] O.R.S.

The heartwoods of *P. bungeana* and *P. gerardiana* contain stilbenes and flavanones, including C-methyl-flavanones, but none of the other flavones or dibenzyls that have been found in all other Pines from

the subgenus *Haploxylon*. The heartwood constituents of *P. formosana* (pinosylvin, pinosylvin monomethyl ether, dihydropinosylvin, dihydropinosylvin monomethyl ether, pinocembrin, chrysin, pinostrobin, pinobanksin and strobobanksin) and of *P. longifolia* (pinosylvin, pinocembrin, and tectochrysin) are those that might be expected from their taxonomic relationships except that *P. longifolia*, unlike all the other *Diploxylon* Pines investigated, contains no pinosylvin monomethyl ether. [Cf. *For. Abstr.* 13 (Nos. 1537–9).]

1535. Lindstedt, G., and Misiorny, A. **Constituents of Pine heartwood XXX. A method for the quantitative estimation of pinosylvin phenols in Pine [*P. sylvestris*] heartwood.** *Svensk PappTidn.* 55 (16½), 1952 (602–4). 8 refs. [E.e.] P.R.

The method is based upon separation of the phenols by paper chromatography and spectrophotometric determination after extraction from the paper. It needs only small amounts of wood. *From authors' summary.*

1536. Erdtman, H., and Misiorny, A. **Constituents of Pine heartwood XXXI. The content of pinosylvin phenols in Swedish Pines.** *Svensk PappTidn.* 55 (16½), 1952 (605–8). 9 refs. [E.e.] P.R.

The content of pinosylvin phenols in *P. sylvestris* (25 trees from south-western, 125 from central, and 24 from northern Sweden) was determined by a colorimetric [cf. *For. Abstr.* 13 (No. 644)] and a spectrophotometric [see preceding abstract] method. The latter was found to be more accurate, especially for phenol contents exceeding 1%. Pines grown in conditions as identical as possible showed considerable individual variation, indicating that genetic factors may be important. The ratio of pinosylvin to pinosylvin monomethyl ether is subject to considerable variation. The relative pinosylvin content is higher in the peripheral than in the central part of the heartwood. The total amount of pinosylvin phenols is generally less at the centre than at the periphery and, as the monomethyl ether is less toxic and condenses less rapidly with lignin than pinosylvin itself, this explains why Pine heartwood is attacked by fungi preferentially in the central part, and why the central portions of Pine heartwood, or wood from young Pines with little heartwood, is more easily digested by the sulphite method than wood from mature trees. The branches and root heartwood are particularly rich in pinosylvin phenols.

813.4. Chemical Effects of Heat. Chemistry of Thermal Decomposition

See also Nos. 1729 *et seq.*

1537. Gillet, A., and Urlings, J. Pyrolyse comparée du bois, de la cellulose, de la lignine et des houilles. 1re partie. Pyrolyse graduée systématique du bois. **[Comparative pyrolysis of wood, cellulose, lignin, and coals. 1. Gradual systematic pyrolysis of wood.]** *Chim. et Industr.* 67 (6), 1952 (909–19). 8 refs. [F.f.] D.S.I.R.

Presents tabulated and graphed results of an investigation to check the conclusion arrived at by one of the authors [cf. *For. Abstr.* 12 (No. 2208)] that chemical reactions occurring in a young coal during a few minutes of pyrolysis above 400° C. are essentially identical with those taking place extremely slowly in a coal-bed during geological ages. It has been possible to 'extrapolate down to wood' this statement after having checked it for all kinds of coal beginning with the youngest ones. The principles of the method applied were: (1) working in an atmosphere devoid even of traces of oxygen; (2) rapid indirect heating to a constant temperature, and rapid cooling; (3) using wood specimens of $2 \times 2 \times 15$ mm. or even less, in order to obtain homogeneous reactions throughout the entire mass of wood; (4) noting the duration of heating; (5) rapidly eliminating the volatile products by a current of N; (6) analysing the solid residue of the reaction (C and H; O by subtraction); (7) expressing the results in numbers of atoms of C, H, and O, the conventional number of C atoms in the crude material being taken as 72. The temperature of heating varied between 105 and 505° C., its duration between 1 and 4 hours; horizontal and vertical tubes were used for retorts. As in the case of coal, wood when heated rapidly to a sufficiently high temperature, shows immediately a violent decomposition which stops abruptly before being completed. It is suggested that the period of active decomposition is connected with the generation in the bulk of wood of a liquid phase, perhaps due to the solubilization of a gel or to an absorbed liquid. The 'incomplete' active pyrolysis of wood starts at 250°, the losses of the 3 elements being in the ratio of C : 2H : O; at 325° the residue still has the appearance of wood, although it is dark brown and has lost 57% in weight. It has been found (by calculation of analytical results) that air-dry wood, when heated for 4 hours at 105° in a current of N, loses not just water but probably a mixture of glyoxal with glycolaldehyde, plus some water. Prolonged extraction of an Oak (sapwood) sample did not introduce any significant changes in the composition (CH_2O) of the water-soluble substance, substance volatilizing at 100°, and substance lost during active pyrolysis.

813.6. Effect of Chemicals on Wood. Resistance to Chemical Attack

See No. 1598.

814. *Natural Durability. Old Wood. Fossilized Wood*

See also Nos. 1010, 1643, 1655, 1661.

1538. Purushotam, A., and Mascarenhas, M. J. **Standardisation of accelerated durability tests on timber species.** Forest Research Institute, Dehra Dun. 1952. pp. 30. 15 refs. (6th British Commonwealth Forestry Conference, Canada, 1952.)

Includes an appendix giving graveyard test data for heartwood stakes of 236 Indian species.

1539. Eeckhout, L. E. Wordt de duurzaamheid van het hout door het stomen verminderd? **[Is the durability of wood decreased by steaming?]** *Meded. Lab. Houttechnol., Gent* No. 10, 1952. pp. 5. 12 refs. [Flem.f.e.g.]

In tests on partly dried Pine and on green and air-dry Beech, blocks were steamed for about 12 hrs. and, after drying and weighing, exposed with unsteamed controls to *Coniophora cerebella* and (Pine only) to *Polystictus versicolor*. The resistance of steamed and unsteamed samples of green Beech was roughly the same, but that of steamed air-dry Beech was much less than the unsteamed control. The resistance of steamed, partly dry Pine to both fungi, while less than that of the unsteamed control, was reduced less severely than that of steamed air-dry Beech.

815. *Effect of Growth Factors on Structure and Properties*

See also Nos. 1495, 1499, 1501, 1506–7, 1514, 1576.

1540. CHOWDHURY, K. A. **Rate of growth and quality of tropical woods.** Forest Research Institute, Dehra Dun. 1952. pp. 2. (6th British Commonwealth Forestry Conference, Canada, 1952.)

The correlations between strength and rate of growth that have been established for timbers of the temperate zone are only partially applicable to tropical timbers, in which the effect of very fast or very slow growth is more pronounced. In the non-porous wood of *Picea morinda*, the strongest timber is produced when the rate of growth is 7–16 rings/in. Timber with fewer than 7 or more than 16 rings/in. is likely to be deficient in strength. In the ring-porous Teak, very fast-grown wood (1–2 rings/in.) is weak and spongy. Another point of importance is that the strength of tropical timbers is not always proportional to their weight, since they usually contain heavy deposits of a gummy nature.

1541. SCOTT, C. W., and MACGREGOR, W. D. **Fast-grown wood, its features and value, with special reference to conifer planting in the United Kingdom since 1919.** Forest Products Research Laboratory, Princes Risborough. 1952. pp. 20. 46 refs. (6th British Commonwealth Forestry Conference, Canada, 1952.)

The rates of growth and timber quality of the seven chief species of conifer grown in the U.K. are examined. These rates, in the plantations of the quality classes expected to be most common in the U.K., range on the average from 8 or 9 annual rings per inch for Sitka Spruce and Douglas Fir to 13½ for Scots Pine. This is at least 2½ to 1⅛ times as fast as the growth rate (20 rings and up) of much of the softwood imported into the U.K. from the Baltic and Canada, other than second-growth or other fast-grown Douglas Fir. The evidence on the timber quality of the relatively fast growing crops in the U.K. is encouraging, assuming that excessive knots are eliminated or reduced by good tending, including pruning where that is justified. The relations between growth rate and timber quality are reviewed in some detail, as it is well known that other factors, including specific gravity, late-wood (summer-wood) and ring age or position relative to the pith are important. The relevant evidence from other countries is reviewed and suggestions are made for further research. In this field collaboration between silviculture and forest products research is particularly important. *Authors' summary.*

82. CONVERSION, SHAPING, ASSEMBLY AND FINISHING OF WOOD: GENERAL

See also Nos. 937–8.

1542. **Machine tools and equipment: aids to efficiency and production of particular interest to the woodworking industry exhibited at the International Machine Tool Exhibition, held at Olympia, London.** *Wood* 17 (9), 1952 (361–3).

1543. **Machine tool exhibition.** *Timb. Tr. J.* 202 (3966), 1952 (1809–12).

Describes with illustrations some of the saws and other woodworking equipment exhibited by British firms at the International Machine Tool Exhibition in London, September-October 1952.

1544. **International machine tool exhibition at Olympia.** *Cabinet Mkr.* No. 2760, 1952 (892–5). P.R.

Describes with illustrations some equipment shown by English firms.

821. *Barking*

1545. HANSEL, S. **Operation of hydraulic barkers.** *B.C. Lumberm.* 36 (9), 1952 (64, 66, 105–6, 108).

Discusses the most important factors to be considered in installing and operating these.

1546. HARVIN, R. L., NOLAN, W. J., and BROWN, W. F. **The barking of Turkey Oak.** *Tappi* 35 (9), 1952 (164*A*–168*A*). 6 refs. P.R.

Drum barking was found to be a satisfactory method for *Quercus laevis*, the time required being 2–3 times that for Southern Pine. *From authors' summary.*

822. *Saws and Sawing*

See also Nos. 1567–71, 1573.

1547. **Sawing studies.** *Rep. For. Prod. Res. Bd., Lond. 1951*, 1952 (26–7).

Formulae have been developed to determine maximum permissible feed speed, or the pitch at a given feed speed, for correct cutting action with spring-set teeth. Investigations have included tests on Agba [*Gossweilerodendron balsamiferum*] to determine the relationship of feed to power for long, medium and short tooth pitches.

1548. **Remote control edgers.** *Timberman* 53 (11), 1952 (66 . . . 72, 114–5).

Describes shifting mechanisms designed so that saws can be set for edging by an edger on a platform above the machinery, giving a better view of the piece of timber in greater safety.

1549. [GUILLIET.] **Maintenance and sharpening of wide swage-set bandsaws.** *Wood* 17 (4; 5), 1952 (150–1; 194–6).

Translated from the French. Includes a table of suggested tooth profiles for 24 selected African hardwoods.

824. *Forms of Joint. Jointing and Assembly*

824.1. Nailed Joints

1550. Sallenave, P. Une technique nouvelle: le clouage des bois durs au pistolet. (Essais effectués sur l'Azobé.) [**A new technique: nailing hard woods with a pistol. (Tests carried out on *Lophira procera*).**] *Bois For. Trop.* No. 25, 1952 (333–6). [F.e.span.]

Describes (with illustrations) a method for nailing very hard tropical woods, developed and patented by the Centre Technique Forestier Tropical. Ordinary nails can be used, and these are inserted in a 'marteau-éclair' or pistol-hammer of the type used for nailing concrete and metal, and 'fired' into the wood. Cartridges of varying size are used according to the size of the nail.

824.4. Dowelled Joints

1551. Nearn, W. T., and Norton, N. A. **Further notes on the effect of hole size on the strength of dowel joints in tension.** *Res. Pap. Pa. St. For. Sch.* No. 17, 1952. pp. 5. 2 refs.

Cf. *For. Abstr.* 14 (No. 683).

824.8. Glues and Gluing

See also Nos. 1561, 1577, 1585, 1748.

1552. Brandts, T. G. **Cold-press wood adhesives from Kapok [*Ceiba pentandra*] seed and Kapok-seed cake.** *Tectona* 42 (1/2), 1952 (8–16). 9 refs. [E.]

Direct extraction of washed Kapok-seed cake with dilute solutions of NaOH appears to be a promising method of producing cheap plywood adhesives on a commercial scale in Indonesia.

1553. Podbrežnik, F., and Maftej, I. Prilog poznavanju lepljenja šperploča sa domaćim belančevinskim lepkovima. [**Domestic protein glues for plywood gluing.**] *Šumarstvo* 4 (6), 1951 (359–66). 10 refs. [Serb.f.]

Tabulated results of local tests conducted with a gluing mixture; 380 parts by weight of water, 160 parts of NaOH solution (3·4 Baumé), 3 parts CaO, and 100 parts of protein 'SN3' obtained from sunflower seed cakes (proved the best).

1554. Hogan, J. T., and Arthur, J. C. Jr. **Cottonseed and peanut meal glues: permanence of plywood glue joints as determined by interior and exterior accelerated cyclic service tests.** *Journal of the American Oil Chemists' Society, Chicago* 28 (6), 1951 (272–4). 3 refs. D.S.I.R.

It has been shown that of the 3 protein glues tested, commercial casein glue is most resistant to both interior and exterior accelerated service tests and that cottonseed-meal glue is superior to peanut-meal glue and compares favourably with commercial casein glue on an interior-test basis for 5 cycles, the strength of the casein bond changing from 384 to 283 lb./sq. in. and of the cottonseed-meal bond from 375 to 264 lb./sq. in. Cottonseed-meal glue can probably be used for bonding plywood designed primarily for interior uses, for regions of comparatively low relative humidity, and for bonding plywood that may be used in building-forms for temporary purposes. *From authors' summary.*

1555. **Properties of adhesives.** *Rep. For. Prod. Res. Bd., Lond. 1951*, 1952 (19–21).

Records of long-term durability trials over 5–6 years. (1) *Lap joints stored at constant conditions of 25° C. and 60% relative humidity:* Longevity of the urea glues tested over 5–6 years, as indicated by high joint strength, appears questionable, especially in thin glue lines. Performance of the phenolic and resorcinol glues tested over 3–6 years is satisfactory in both thick and thin glue lines. (2) *Plywood panels stored at normal temperatures indoors and in racks exposed to weather in the field:* Neither urea nor phenolic glues are affected by indoor storage, but under weathering the former fail completely in less than 2 years. Apparent fall in strength of phenolic glues is brought about by the deterioration of the wood, as other tests show only negligible change in the resin. (3) *Ply-clad frames, in which the adhesive tested is used for gluing the plywood to the frames, exposed to weather:* Rates of deterioration are different from those in (2), but phenolic and resorcinol glues again surpass the urea types.

1556. **Hand-operated portable glue spreader.** *Tech. Notes U.S. For. Prod. Lab., Madison* No. 255, 1952. pp. 1 + 1 photo + 1 dgm. P.R.

An illustrated description of a new glue spreader which can handle material up to 4 in. wide; the reservoir has a capacity sufficient to cover 75 ft. of lumber 2 in. wide at a rate of 50 lb./1000 sq. ft. The device is not patented.

1557. **New machine for mass production of blockboards.** *Aust. Timb. J.* 18 (6), 1952 (467–8).

Describes the G.E.C.-Fielding Radio Frequency Edge Gluing Machine [cf. *For. Abstr.* 13 (No. 2479)] and gives examples of its use with different species of wood.

825. *Cleaving. Adzing. Mechanical Comminution*

See also No. 1620.

1558. Leicher, S. Hidraulična sjekira. [**A hydraulic splitter.**] *Drvna Industrija, Zagreb* 2 (1), 1951 (17–8). [Croat.]

An illustrated description of a horizontal hydraulic splitter, designed by the author and capable of exerting a thrust of ca. 18 tons. The hydraulic pump is driven by a 3·5-h.p. electric motor. The splitter is intended primarily for the comminution of wood for distillation or tannin extraction.

827. *Bending. Moulding (other than by Cutting)*

1559. Saito, Y., Kitahara, K., and Ishii, K. **An experimental study in wood bending.** *Wood Industry* [, *Japan*]. 6, 1951 (12–7). From *abstr.* in *Rec. Res. Fac. Agric. Univ. Tokyo* No. 1, 1950/51 (1952), (76). [E.]

The following results were obtained for *Fagus crenata:* (1) Stress is lower for wood softened by boiling than for that softened by steaming, but stain is more frequent with the former. (2) Stress is lower in sapwood than in false heartwood. (3) For the softening process, 10 min. boiling or 15 min.

steaming are enough for test pieces 10 × 10 cm. in T.S. Over-softened pieces break readily on the side in tension. (4) The stress is the same for bending T.L.S. and R.L.S. (5) The softening temperature must be above 80° C. (6) A high moisture content before softening is desirable.

1560. **[Bending and setting to shape of African Mahogany plywood.]** *Rep. For. Prod. Res. Bd., Lond. 1951*, 1952 (13–4 + 2 photos).

That portion of the plywood which normally would form the concave face of the bend is removed and replaced with a low-density wood such as Balsa, Binuang [*Octomeles sumatrana*] or Western Red Cedar. The inserted piece is glued into the assembly with the grain parallel to the axis of curvature, glue is spread on the exposed face of the insert and a thin veneer, its grain at right angles to that of the insert, is placed over it just before the actual bending takes place. Before the glue has had time to set the assembly is placed in position on a heated bending jig and pressed into the required shape. The glue is allowed to set before the completed bend is removed from the jig. Tests have so far been limited to the production of bends up to 6 in. in width.

1561. GRAHAM, P. H. **High frequency molding of curved plywood is faster.** *Veneers & Plyw.* 46 (10), 1952 (10, 30, 32). P.R.

An illustrated description of a procedure to obtain bent plywood by applying R.F. to glue-spread veneer set-up enclosed in a mould under pressure (200 to 300 lb./sq. in.), the material between the electrodes being heated up to 275° F., while the complete cycle takes from 5 to 30 minutes, depending upon the shape and size of the plywood and other factors. Metal or wood are used for moulds, while Cu and Al are preferred as electrode material.

829.1. *Finishing*

See Nos. 1649, 1689.

83. TIMBER MANUFACTURING INDUSTRIES AND PRODUCTS. USES OF WOOD AS SUCH

See also Nos. 1466, 1474–5.

1562. MÜLLER, W. [Editor]. Arbeitsstudien und Vorkalkulation in Holzbetrieben. **[Time studies and advance calculations in woodworking industries.]** Carl Hanser-Verlag, Munich 1951. pp. 134. 18 refs. [G.] (*Fachschriften für Fertigungstechnik und Arbeitsstudien in den Holzindustrien*, No. 1.)

1563. IRELAND, W. A. **Where there's a wood there's a way.** *Quart. Rev. Timb. Developm. Ass.* 3 (7), 1952 (9–10).

Gives some examples of the uses of Abura [*Mitragyna* spp.], Meranti [*Shorea* spp.], and home-grown Larch for roof structures, of Iroko [*Chlorophora excelsa*] and *Daniella* as coffin boards, of Makoré [*Mimusops heckelii*] for bench tops and lorry bottom boards, and of Gurjun [*Dipterocarpus* spp.] for lorry bearers and cross members.

1564. PEARSON, F. G. O., and RICHARDS, E. G. **Utilisation of young plantation timbers in Great Britain.** Forestry Commission, London. 1952. pp. 8. (6th British Commonwealth Forestry Conference, Canada, 1952.)

[Cf. *For. Abstr.* 13 (No. 3275); 14 (No. 1201).] The principal uses for thinnings are enumerated, the requirements of each market described, and an account given of the Brandon Produce Depot.

1565. WYK, J. H. VAN. **The utilisation of young plantation timbers in South Africa.** Forest Products Institute, Pretoria West. 1952. pp. 8. 5 refs. (6th British Commonwealth Forestry Conference, Canada, 1952.)

Deals mainly with thinnings from plantations of exotic conifers, but also from Wattle and Eucalypt plantations.

831. *Fuelwood and Various Types of Rough Timber*

See also Nos. 1469, 1640–3, 1647, 1677.

1566. KROGH, P. M. D. **The twisting of wooden telephone poles in service in South Africa.** Forest Products Research Institute, Pretoria West. 1952. pp. 15. (6th British Commonwealth Forestry Conference, Canada, 1952.)

This paper describes an experiment, which was first initiated in 1927, re-established in 1930, and again in 1946, designed to determine (*a*) the relationship between spirality of grain and actual amount of twisting which takes place in poles, due to changes in weather conditions, and (*b*) the effect on the degree of twisting of impregnating poles with preservatives. The results are given in graphical form, which shows this relationship clearly and also discloses how twisting is affected by time and variations in weather conditions. The efficacy of creosote as a means of reducing the degree of twisting and fluctuations therein is also demonstrated. The question of allowing creosoted poles to reach equilibrium moisture content before putting them into use, in order to eliminate twisting due to seasoning, is discussed and recommendations are made in regard to modifying the minimum figure laid down for spirality in an existing specification for creosoted wooden telephone and electric transmission poles; the reason for not recommending water-borne preservatives, where twisting of poles is a disadvantage, is clarified. *Author's summary.*

832. *Mills, Their Functions and Products*

832.1. Sawmills and Planing Mills

See also Nos. 1232, 1547–9.

1567. SIMMONS, F. C. **Sawmill techniques.** *Proc. UNSCCUR, Lake Success, 1949* 5, 1951 (217–24). Many refs.

Discusses the merits of circular-saw mills, band-saw mills, frame-saw mills and combined mills; with a short glossary of sawmilling terms.

1568. ENTRICAN, A. R. **Sawmill techniques in the conservation of forest resources.** *Proc. UNSCCUR, Lake Success, 1949* 5, 1951 (225–7).

Discusses in some detail the evolution of sawmill practice in New Zealand in the light of her change from an abundant virgin resource to smaller-sized exotic conifers and of a close study of practices

abroad. The frame-sawing technique eventually adopted, specially suited to 16-ft. logs, 70% of which have a sweep of over 3 in., is described in some detail and the need for integrated mills emphasized.

1569. WANARAKS, P. A. **Sawmill techniques.** *Proc. UNSCCUR, Lake Success, 1949* 5, 1951 (227–30). 6 refs.

Gives particulars of the lay-out and techniques of the 6 large, 68 medium and 228 small sawmills in Siam.

1570. HUGHES, J. F. **Utilization problems in Tanganyika.** Government Printer, Dar es Salaam. 1952. pp. 7. (6th British Commonwealth Forestry Conference, Canada, 1952.)

Deals mainly with sawmills, their ownership, operation, equipment etc.

1571. **Sawmill operating conference.** *Timberman* 54 (1), 1952 (52 . . . 80).

An account of the third conference held at Portland, Ore., Sept. 1952, with a record of discussion on: sawmill methods in the Fir and Redwood region, and in the Pine region; filing and conditioning of saws. Some methods and machinery are briefly described.

1572. HYLER, J. E. **Lumber handling.** *Sth. Lumberm.* 185 (2313; 2315), 1952 (60 . . . 70; 66 . . . 76).

Covers N. American practice in sorting, classifying, transport and storage within the mill.

1573. MERILUOTO, J. ARI-sahaus. **[Sawing by the ARI method.]** *Pap. ja Puu* 34 (10), 1952 (366–70, 392). [Fi.e.] P.R.

The use of the Swedish ARI system (comprising a single-blade circular saw, a specially constructed rip-saw and an ordinary edging saw) is compared with that of frame saws. For an annual output of 1600 std. with equal prices for frame- and circular-sawn stock, the ARI system proved economically more profitable than single and double short-stroke frame saws and than high-speed frame saws. If the price for circular-sawn timber is 2·5% less than that of frame-sawn timber, the corresponding annual limit will be about 930 std. The ARI system is particularly suitable for handling sawn goods of a processing plant.

1574. **Conversion studies.** *Rep. For. Prod. Res. Bd., Lond. 1951*, 1952 (28).

A study was made on 20 logs of Japanese Larch from 60-ft. plantation trees cross-cut into 20-ft. lengths. Outturn of sawn stock in commercial joinery sizes averaged 56·6% and 51·4% of true volume u.b. for butt and middle logs respectively. Top logs were not converted because of their poor shape and the large number of knots.

1575. MATSON, E. E. **Lumber grade recovery from Oregon coast type Douglas-Fir.** *Res. Pap. Pacif. Nthwest. For. Range Exp. Sta.* No. 3, 1952. pp. 10 + 6 gphs.

Results of a study on 324 logs are given in graphs and tables, to show sawing time by log diameter and length, grade recoveries in % of the lumber green-chain tally by log quality, a summary of log volume in bd. ft., lumber grade recovery in % for all study logs, and defect and overrun by log size.

1576. MATSON, E. E. **Lumber grades from young-growth Douglas-Fir.** *Res. Notes Pacif. Nthwest. For. Range Exp. Sta.* No. 79, 1952. pp. 2. 2 refs.

Combined results of two studies on 1693 logs show that practically all Douglas Fir logs cut from timber up to 100 years will produce at least 65% No. 1 Common or Better lumber. They should therefore be classed as No. 2 sawmill logs if they are big enough. No clear grades can be expected, however, unless the stands are given some treatment such as pruning. Figures showing lumber grade recovery for logs of different diameters are tabulated.

832.2. Veneer and Plywood Mills, including the Manufacture of Composite-Wood Assemblies

See also Nos. 1505, 1509, 1552–7, 1560–1, 1689–90, 1695.

1577. KNIGHT, R. A. G. **Revised manual for conducting trials of timbers for plywood manufacture.** Forest Products Research Laboratory, Princes Risborough. 1952. pp. 14.

The appraisal of a timber is based on its availability, estimated extraction rate, and degrade found to occur in felling, storage and transit, the results of processing trials to ascertain the best pre-treatment, peeling and drying characteristics, splicing, veneer handling, gluing properties, the best gluing conditions etc., yield measurements, and suitability for British mills and for plywood-making generally.

1578. **Trials of timber for plywood manufacture. Progress report 16. Preliminary tests on three British Guiana species.** Forest Products Research Laboratory, Princes Risborough. 1952. pp. 9.

Results of tests on *Carapa guianensis*, *Protium decandrum*, and *Swartzia leiocalycina*.

1579. **Conditioning of veneer logs.** *Wood, Chicago* 57 (9), 1952 (44, 54, 56). P.R.

Describes the schedule adopted by the Quimby Veneer Co. for conditioning logs (particularly Birch logs) before cutting. Tree-length logs are cooked for 4 days in hot water, the temperature being raised from 160° to 200° F. or slightly over. These logs are then cut into bolts of proper length, barked and smoothed and finally cleaned before proceeding to the cutting lathe. Other developments mentioned are: a mechanical reeling system and the use of knife-holders in which the knife is pre-set.

1580. **Veneer drying.** *Rep. For. Prod. Res. Bd., Lond. 1951*, 1952 (10–1, 23).

Green veneers of *Guarea* sp. and Sapele [*Entandrophragma cylindricum*] straight from the slicers and cut to a thickness of 0·6 mm., were formed into ½-in. and 1-in. packs and piled with 1-in. sticks at 8-in. intervals in the manner normally used for piling solid timber. Drying was satisfactory although it is possible that with wider sheets or species that shrink more, the restraint imposed by this method of piling might cause splitting. The 1-in. packs were dried from green to 15% moisture content (m.c.) in 122

hrs. and the $\frac{1}{2}$-in. packs in about $\frac{1}{3}$ of that time. In a stack of given dimensions the quantity of veneer that can be accommodated is increased by only 50% by increasing pack thickness from $\frac{1}{2}$ to 1 in., so that the output from a kiln in a given time would be roughly only $\frac{1}{2}$ of that obtained with $\frac{1}{2}$-in. packs. Slightly more labour is used in loading and unloading thinner packs. Experiments have been made to find a correlation between the average m.c. figure for a batch of veneers, and the maximum m.c. over a small area. Results are tabulated to show the general average m.c. of 30 samples, and the % of the 30 samples that will have a m.c. below 20, 15 and 10%. Figures for an average of 3–5%, are 95, 87 and 55% respectively, for 6–8%, 77, 58 and 5%, and for 9–11%, 65, 17 and 3%.

1581. Burgess, P. **The 'Lever Aid' in the knife testing of plywood [glue bonds].** *Wood* 17 (9), 1952 (340–1). [Forest Products Research Laboratory, Princes Risborough.]

The use of the 'Lever Aid', consisting of a knife, a lever, a ball joint between the knife and lever and two hinges on the lever permitting simultaneous action in the horizontal and vertical planes, reduces the muscular effort needed by the plywood inspector while retaining all the 'feeling' characteristics of the manual operation of the knife.

1582. Narayanamurti, D. **Standardisation of test methods of composite wood products.** Forest Research Institute, Dehra Dun. 1952. pp. 6. 49 refs. (6th British Commonwealth Forestry Conference, Canada, 1952.)

1583. Hearmon, R. F. S., and Adams, E. H. **The bending and twisting of anisotropic plates.** *Repr. from British Journal of Applied Physics, London* 3 (5), 1952 (150–6). 7 refs.

The theory of the deflexion of anisotropic plates under bending and twisting loads is summarized; experimental methods for investigating the theory are described and tested on metal plates. The results of experiments on plywood cut at various angles to the grain are given and found to conform with the theory. *Authors' summary.*

1584. Perry, T. D. **Types of plywood. Part 11. Thin plywood for aircraft.** *Wood Wkg. Dig.* 54, Sept. 1952 (135–8, 140, 142, 144). P.R.

Illustrated description of various stages in the manufacture of thin plywood used in aircraft construction.

1585. Siimes, F. E., and Liiri, O. Vaneriteknillisiä tutkimuksia I. **[Technical investigations on plywood, I.]** *Tiedoitus, Valtion Teknillinen Tutkimuslaitos, Helsinki* No. 95, 1951. pp. 66. 11 refs. [Fi.e.] P.R.

The following results were obtained in a study of the manufacture of Birch veneer and plywood, and of gluing Pine plywood: (1) Effect of cooking and steaming on the colour of Birch logs—(*a*) When cooked and steamed at temperatures below 50° C. logs do not turn brown. (*b*) When cooked at over 50°, brown stains spread rapidly from the ends of the logs during cooling; to prevent this, cutting must be done as soon as possible after cooking. (*c*) At temperatures above 50°, discoloration is considerably greater in logs in steam than in water. (2) Within the range of temperatures used (20–80°) rotary-cutting resistance decreases linearly with increasing temperature, in accordance with the formula $K_{tx} = K_t \left(1 - \frac{tx - t}{250 - t}\right)$ where K_{tx} is cutting resistance at temperature tx and K_t at temperature t. (3) In cutting 1·5 mm. Birch veneer the best lathe set was found to be: angle of pressure bar 70°, height of knife $\pm$ 0 mm., clearance angle $\pm$ 0°, and degree of pressure 20%. (4) Cooling Birch plywood after gluing—(*a*) The various cooling methods differ little, but continuous use of the cooling fan is not desirable because the heat of the plywood tends to warm the air rather than evaporate the water from the wood. Decrease in moisture content occurs at the beginning of cooling, and is less in thick than in thin plywood. (*b*) The speed of cooling depends on ply thickness. A hot pile of plywood retains heat for a comparatively long time. (*c*) Moisture content depends on the amount of glue used and on the moisture content of both the glue and the plies. (*d*) Discoloration and cramping are no greater in hot-piled than in cooled plywood, but there is an unpleasant odour. Hot-piled plywood has no greater tendency to develop mould than other plywood; moulding depends on the moisture content of the plywood. (5) Gluing Pine plywood.—Albumin-casein glue made alkaline with a mixture of NaOH and waterglass gave satisfactory results even on resinous Pine. It was also possible to glue resinous Pine with an ordinary adhesive from casein powder and with urea resin adhesive, but liquid phenolic resin gave the best results. The illustrations and numerous graphs have English legends.

1586. **New process for making hardwood veneer panels.** *Wood, Chicago* 57 (12), 1952 (26–7). P.R.

Report of a talk by C. Kreider (of Elmendorf Research Corp.). The new method lends itself to the manufacture of panels from $\frac{1}{8}$- to $\frac{3}{4}$-in. thick, the panels differing from conventional plywood in that the core is made of fine wood particles from wood waste, while the face veneers are much thinner than conventional face veneers. The process is suitable for relatively cheap, short logs. Veneers as thin as $\frac{1}{64}$ in. are one feature of the process, the other being the plugging of all open defects, the veneers with plugged defects being used for the backs. The whole process of manufacture is completely mechanized.

1587. Le cartobois. **['Cartobois'.]** *Emballages, Paris* 20 (121), 1950 (20). [F.] L.S.

Ten models of boxes appeared on the French market in 1950, made from Cartobois, a patented material obtained by gluing a thick cardboard to a specially treated thin Pine veneer, the other face of which is covered with kraft paper. It is claimed that a Cartobois sheet 2·5 mm. thick has a compression strength of 40 kg./sq. cm., and a sheet 4·5 mm. thick a strength of 90–100 kg./sq. cm.

1588. Boehm, R. M. **Application of hardboard in veneered panels.** *J. For. Prod. Res. Soc.* 2 (1), 1952 (100–5). P.R.

Describes the properties of (1) a thick furniture panel in which hardboard is laminated between a lumber core and the veneer face, and (2) a three-ply veneered panel with hardboard as a core.

1589. **Glued structural members.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1903–8, 1952. pp. 23 + 3 dgms. + 4 gphs. + 1 tbl. 12 refs. P.R.

Various properties of glued laminated members, and wood/plywood members of built-up cross-section are surveyed, and the following discussed: (*a*) for glued laminated members, the effects of knots, cross grain, laminations, joints, shakes, checks, splits, and beam depth on the strength, together with the design of members and estimation of various stresses; (*b*) for wood/plywood beams and girders, the design of flanges and webs and joints between them, and the calculation of stresses, and lateral stability of beams and girders.

1590. Nearn, W. T., and Norton, N. A. **Strength properties of laminated Yellow Poplar [*Liriodendron tulipifera*] beams tested green and air dry.** *Res. Pap. Pa. St. For. Sch.* No. 18, 1952. pp. 8. 5 refs.

832.8. Integrated Mills and Combinations of Mills

1591. Rehman, M. A. **Integration of forest industries in the under-developed areas—suggestions for the integrated use of logs, sawn timber and dimension stock with special reference to Indian conditions.** Forest Research Institute, Dehra Dun. 1952. pp. 2. (6th British Commonwealth Forestry Conference, Canada, 1952.)

1592. Narayanamurti, D. **Integrated wood utilization [in India].** Forest Research Institute, Dehra Dun. 1952. pp. 3. 7 refs. (6th British Commonwealth Forestry Conference, Canada, 1952.)

833. *Timber in Buildings and Engineering Structures (Manufacture and Use)*

833.1. Building Components and Fittings: General

See also Nos. 1589–90.

1593. Wood, L. W. **Testing wood doors for stability and strength.** *J. For. Prod. Res. Soc.* 2 (2), 1952 (28–32). P.R.

Outlines the following methods developed at Madison: exposure to changing and to differential moisture conditions; strength tests (stiffness tests); falling ball and sandbag impact. Results of preliminary tests are described.

1594. **Performance tests of doors.** *Rep. For. Prod. Res. Bd., Lond. 1951,* 1952 (17–8).

Representative types of door have been tested for different strength properties. In torsion tests, flush doors proved considerably stronger than panelled types and the test was discontinued when a maximum force of 500 lb. was reached. Preliminary tests had indicated that the maximum pressure exerted by a shoulder against the door was about 150 lb., but this could be maintained for a short period only and was less severe than a similar load applied continuously as in test conditions. Of the 39 panelled doors, 31 were intended for interior use and their average breaking load was about 240 lb. The remainder, slightly heavier doors for external use, were on average about 50% stronger. Four doors with mortice-and-tenon joints failed by splitting of the stiles through the corners of the mortices; they were no stronger than the remaining panelled types of dowelled construction which failed typically by splitting at the ends of the stiles and exceptionally, when the timber was very cross-grained, by fracture of the stile at the lock recess. The strength of the flush doors was generally above 500 lb., but those with cores of Western Red Cedar generally split at the hinge fixing at loads below this figure. In these tests the stiffness of the doors was generally proportional to their strength. A slamming test was devised in which doors were slammed automatically at about 3 slams/min. The endurance of the lighter panelled doors ranged from 323 to 6858 slams, but two similar heavier doors failed after 52 and 200 slams. Failure was mainly by fracture of the dowels in the closing stile joints. The endurance of the flush door was generally lower but ranged from 8 slams to 11,629 unbroken. The failures were principally by splitting of the stiles at the hinge fixing; this type of failure and the generally inferior performance of the flush doors is probably caused by their higher stiffness as shown in the torsion test.

1595. **Flooring tests.** *Rep. For. Prod. Res. Bd., Lond. 1951,* 1952 (12–3).

In a preliminary experiment on moisture content (m.c.) and dimensional changes in strip floors laid over heating pipes, samples of Gurjun, Teak, Maple (flat-sawn) and Beech (quarter-sawn) were assembled in the form of a box into which was introduced an electric tubular heater. The initial m.c. of the Teak was 8 and of the other species 10%. Probable service conditions were simulated by placing the assembly in air, conditioned to 45% humidity, and maintaining a temperature of some 13° F. above that of the surrounding air at the surface of the strips. When equilibrium was established, the gaps between the strips were measured and the assembly was placed in air at 75% humidity without additional heating. Finally the assembly was re-subjected to the first temperature and humidity conditions. Results are tabulated and suggest that wood floors might be expected to dry on occasions to m.c. of as little as 5–6%. The gaps between the strips after the second exposure in air at 45% humidity ranged from 0·012 to 0·033 in., in all cases higher than those after the first exposure.

1596. Silvester, F. D. **Wood block flooring and panel heating.** *Quart. Rev. Timb. Developm. Ass.* 3 (7), 1952 (22–3).

Wood blocks were laid on four hollow concrete floor beams heated by electric panel-heating units. English Oak blocks were laid on three beams using different types of bonding material for each panel, and Teak in bitumen mastic on the fourth. The heat was maintained for a certain period in conditions resembling those obtained with panel-heating during

winter, and was then switched off completely, conditions being adjusted to correspond as closely as possible to those in summer in a new unheated building. Results indicate that wood-block flooring can be used with panel-heated floors, if it is seasoned to the correct moisture content and if a bonding material is used that will prevent undue movement of the blocks. The movement of Oak was restrained to a remarkable degree by the bonding materials.

833.2. Special Uses in Residential, Commercial and Public Buildings

1597. **Wood seats for stadiums.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1006 (revised) 1951. pp. 7 + 2 dgms. + 1 tbl. P.R.

Summary of information obtained in 1929 in a survey of 70 structures. Includes information and conclusions on kinds and grades of wood, decay, joints, protective coatings, preservative treatment, and strength properties.

833.3. Special Uses in Factories and Workplaces

1598. BAKER, D. R. **Wood deterioration in cooling towers.** *Petroleum Engineer, Dallas* 23 (4), 1952 (*C*76, *C*79–80, *C*82). 3 refs. L.S.

The main processes leading to the deterioration of wood in cooling towers seem to be: (1) leaching out of extractives (tannins, essential oils etc.) that impart to wood certain fungicidal properties, and (2) the slow delignification caused probably by the presence of Na_2CO_3 in circulating water. This salt might be either present in natural water or introduced by the use of Na-zeolite water-softening treatment. In the delignification process, some of the carbohydrates are probably also removed. Aeration in the tower furthers the decomposition of tannin and lignin. Ferrous salts absorbed by wood may act as catalysts in the oxidation processes. Alkaline conditions encountered frequently in cooling towers may stimulate fungal growth.

1599. **Deterioration of timber in water cooling towers.** *Rep. For. Prod. Res. Bd., Lond. 1951*, 1952 (33–4).

Laboratory experiments have shown that *Chaetomium globosum* can cause rapid decay and loss of weight in Beech containing added nutrient inorganic salts, and less rapid decay when no nutrients are added. Chemical analysis of the decayed Beech wood shows that preferential removal of cellulose occurs but that the % solubility of the wood in dilute alkali does not increase, as it does with a typical brown rot. Comparable decay of Beech with two other *Chaetomium* spp. has been demonstrated. Attack of softwood by *C. globosum* has been shown in pure culture on a number of occasions but attack has always been slight. A number of cultures of Ascomycetes and Fungi Imperfecti isolated in S. Africa from treated hardwood in contact with the soil have been studied. It has been shown that 6 of the 20 species examined cause decay of Beech similar to that caused by *C. globosum*. It is possible that in special circumstances almost any fungus capable of attacking cellulose may be able to decompose ligno-cellulose in wood. [Cf. *For. Abstr.* 13 (Nos. 4333–4).]

834. *Shingles. Cooperage. Packing Containers*

See No. 1587.

835. *Industrial and Domestic (Utility) Woodware. Toys and Models. Sports and Recreational Goods. Musical, Scientific and Mathematical Instruments. Surgical Uses etc.*

1600. REHMAN, M. A. **Standardization of test methods in wood using industries—suggestions for accelerated tests on bobbins.** Forest Research Institute, Dehra Dun. 1952. pp. 2. (6th British Commonwealth Forestry Conference, Canada, 1952.)

1601. REHMAN, M. A., and KISHEN, J. **Deodar as pencil wood.** *Indian For. Bull.* No. 149, 1951. pp. 7.

Methods of staining *Cedrus deodara* and treating it with paraffin wax to improve its whittling properties are discussed. Stained and waxed slats tested by six pencil manufacturers gave good results. [Cf. *For. Abstr.* 13 (No. 2522).]

1602. PARENE, E. L'industria degli abbozzi da pipa. **[The pipe-blank industry.]** *Monti e Boschi* 3 (10), 1952 (446–55). [It.f.e.]

Describes the methods employed in manufacturing blanks from roots of *Erica arborea* in Italy for export to the French tobacco-pipe manufacturers.

836. *Furniture and Cabinet-Making. Carving. Marquetry. Wooden Ornaments*

1603. MERRICK, M. J. **The effect of the height of stretcher rails on the diagonal strength of frames.** *Research Department Report, Furniture Development Council, London* No. 1, [1952?]. pp. 35. P.R.

Tests are described in which the effect is studied of the position of the stretcher rail on the distribution of load between the two main rail joints in a rectangular frame. The tests were carried out on sets of these frames, the stretcher rail being at a different height in each set. The dimensions of each frame approximated to those of the lower side frame of a typical dining chair. A simple comparison of failing loads was not attempted, but use has been made of the deflections of the main rail joints, observed when frames are loaded diagonally, in assessing the effectiveness of the stretcher rail. The results show that the position of the stretcher rail has little effect on the distribution of loads between the two main rail joints, providing the rail is placed more than ca. $\frac{3}{16}$ of the way down the leg of the frame, distances being measured from the centre lines of the main rail and stretcher rail. A theoretical analysis was made, and agreed reasonably well with the experimental results. *From author's summary.*

838. *Vehicles (including Ships, Boats, Aircraft)*

See also Nos. 1489, 1584.

1604. RADIMIR, D. Kakvo drvo traži brodograđevna industrija. **[What wood is used by the**

shipbuilding industry.] *Drvna Industrija, Zagreb* 2 (6), 1951 (1–4). [Croat.]

The main species used in shipbuilding in Jugoslavia are Fir and Oak. Others are: Spruce, Larch, *Pinus nigra*, *P. halepensis*, and exotic conifers; *Quercus ilex*, Ash, Elm, Mulberry, Beech and also some exotics, such as Teak and Lignumvitae.

839.2. *Wood Flour*

See also Nos. 1611–2.

1605. **[Wood flour as an ingredient of foundry sands.]** *Rep. For. Prod. Res. Bd., Lond. 1951*, 1952 (49–50).

The quality of castings is improved if about 1% of wood flour is mixed with the foundry sand forming the mould, but too large an excess may be dangerous. As the wood flour is partly destroyed during casting, a chemical method, depending on hydrolysis of the wood with H_2SO_4 and titrimetric determination of the resulting sugar, has been developed for determining how much wood flour remains in the used sands and how much more must be added. The method, which gives sufficiently accurate and reproducible results, is outlined.

839.8. *Industrial Waste Wood and its Uses*

See also Nos. 1586, 1705, 1713–5, 1727.

1606. Jenkins, J. H. **Wood waste utilization in Canada.** *Bull. For. Br. Can.* No. 103, 1952. pp. 12. (6th British Commonwealth Forestry Conference, Canada, 1952.)

1607. Stamm, A. J. **Utilization of wood waste and bark [in the U.S.A.].** *Proc. UNSCCUR, Lake Success, 1949* 5, 1951 (296–302). 56 refs.

Cf. *For. Abstr.* 12 (No. 3116).

1608. Heritage, C. C., and Locke, E. G. **Utilization of sawmill refuse and bark.** *Proc. UNSCCUR, Lake Success, 1949* 5, 1951 (305–11). 15 refs.

Deals mainly with the use of Douglas-Fir waste (wood and bark separately and together) for fibreboards, in hydrolysis and for bark products.

1609. Ant-Wuorinen, O. **Chemical utilization of wood.** *Proc. UNSCCUR, Lake Success, 1949* 5, 1951 (303–4).

Discusses the use of wood waste in Finland for fibreboard manufacture and in hydrolysis.

1610. Narayanamurti, D. **Wood waste utilization.** Forest Research Institute, Dehra Dun. 1952. pp. 26. 18 refs. (6th British Commonwealth Forestry Conference, Canada, 1952.)

After a brief mention of the importance of wood-waste utilization and the use to which this wastè is at present put in India, the work done at the Forest Research Institute, Dehra Dun, is described. This included development of cork substitutes from the wood of *Cryptomeria japonica* and barks of *Erythrina suberosa* and *Euphorbia nivulia*, which were found suitable for a number of purposes; development of insulation wools from wood barks etc.; development of insulation and hardboards from various wastes (areca-nut husk, tapioca stem, sawdust, barks etc.) by various processes. The methods of preparation and properties of these boards, which compare favourably with foreign ones, are given. *From author's summary.*

1611. Turnbull, R. F. **Wood waste and bark utilization in Australia.** *Proc. UNSCCUR, Lake Success, 1949* 5, 1951 (311–2).

Gives figures for the use of wood waste: of *Eucalyptus* spp. and *Pinus radiata* in pulping; of sawdust of different species for wood flour, linoleum, plastics etc.; of bark from *Acacia* and *Eucalyptus* spp. for tanning; and of various species for production of essential oils.

1612. Utilisation des déchets de bois. **[Wood-waste utilization.]** *Étude tech. Inst. nat. Bois* No. 9, 1952. pp. 16. 20 refs. [F.] P.R.

The annual production of wood waste in France is estimated at 3–4 million cu.m. The present uses of crude and processed sawdust, wood flour, chips, and slabs are described, and possible future uses outlined. Names and addresses are given of some French manufacturers of wood-waste-heated furnaces and boilers, briquetting machines, and wood flour.

1613. Slednikov, A. K. Sžiganie drevesnyh othodov i ščepy v vihrevoï topke tipa Kolobanova. **[Burning of wood waste in the Kolobanov type vortex furnace.]** *Za Ekonomiju Topliva, Moskva* 9 (3), 1952 (33–4). [Russ.] D.S.I.R.

An illustrated description of the furnace, primarily designed for the burning of peat but adapted for wood waste and chips. Tabulated results obtained during 2 years show good performance for moisture contents up to 60%.

1614. **Wood waste boilers for power generation.** *Combustion Engineering, London* 6 (3), 1952 (53–7). D.S.I.R.

Includes a description of four Babcock and Wilcox wood-fired boilers, having a total capacity of 53,000 lb. steam per hour. The consumption of wood waste in winter is some 350 tons per week.

1615. Rice, H. R. **Wood refuse fires boilers at Sigma.** *Canadian Mining Journal, Toronto* 73 (1), 1952 (60–2). L.S.

Presents the result of ca. 2 years' experience in the adaptation of an existing heating plant, previously fired with coal through automatic stokers, to the economic utilization of shavings and fine wood waste, always retaining the possibility of reverting to coal-firing at need. In 1950–51, when wood waste was burned exclusively in the two boilers, the production of steam amounted to 774 lb./cu. yd. of fuel (of varying moisture content, but having an average calorific value of ca. 10,400 B.Th.U./lb.; in steam production, 20·3 cu. yd. of this material is about equivalent to 1 ton of coal).

1616. Chass, R. L., and Feldman, E. S. **Incineration of wood waste in the Los Angeles area.** *J. For. Prod. Res. Soc.* 1 (1), 1951 (135–44). 12 refs. P.R.

Against a background of air-pollution control and the present inevitability of wood-waste incineration, the authors analyse the combustion process and lay down fundamental principles for operating

single- (silo-type) and multiple-combustion-chamber incinerators.

1617. BARRIER, H. Perfectionnements apportés aux procédés de fabrication d'agglomérés combustibles, et aux appareils de moulage utilisés. **[Improved methods of manufacturing fuel briquettes, and improved apparatus for their manufacture.]** *French Patent* No. 993,131, Oct. 26, 1951. pp. 8 + 14 dgms. [F.] P.O.

A method of manufacturing fuel briquettes from cellulose-containing material by: comminution and fractionation so as to obtain particles of nearly even size; drying in two operations, the second being conducted in a reducing atmosphere under a somewhat increased pressure and at the highest temperature that does not start exothermic reaction; compressing the dried material at a high temperature; releasing pressure and cooling the briquettes.

1618. GLAUBERT, S. **Agglomeration of wood waste.** *Brit. Patent* No. 670,012, April 9, 1952. pp. 3. P.O.

Lignin-containing wood waste is successively treated with two acids, one of which is a strong acid such as H_2SO_4 and the other a weak acid like valeric acid, a hardening agent being added. The material is then heat-treated between pressure plates

1619. ALLISON, F. E., and ANDERSON, M. S. **The use of sawdust for mulches and soil improvement.** *Circ. U.S. Dep. Agric.* No. 891, 1951. pp. 19. 30 refs.

1620. MCINTYRE, A. C. **Wood chips, wood chippers and conservation farming.** *J. For. Prod. Res. Soc.* 2 (2), 1952 (65–9). P.R.

Discusses the use of chips for mulching, bedding and litter, pavements, and composting, and the possibility of using portable chippers on farms.

84. PRESERVATION AND OTHER TREATMENTS TO IMPROVE THE PROPERTIES OF WOOD. DAMAGE BY BIOLOGICAL AGENCIES AND ITS CONTROL. SEASONING. TIMBERYARD PRACTICE

841. *Wood Preservation*

See also Nos. 1566, 1654, 1660, 1662 *et seq.*

1621. MARTÍNEZ, J. B. Conservación de maderas en sus aspectos teórico, industrial y económico. Volumen I. Estudio técnico de los antisépticos de tipo oleaginoso. **[Wood preservation from the theoretical, industrial and economic aspects. Vol. I. Technical investigation of oil-type preservatives.]** Instituto Forestal de Investigaciones y Experiencias, Madrid. 1952. pp. xxviii + 550 + 169 photos. [Span.] X.

Part 1 (introductory) includes sections on: causes of decay, properties required of a preservative, general classification of preservatives, choice of preservatives. Part 2 deals with coal tar and its products (creosote), lignite tar, peat tar, wood tar, oil derivatives, and emulsions; two appendixes deal with a series of xylophagous fungi from Spanish Guinea, and with field tests for determining the efficiency of preservatives used with wood in contact with soil. A final note describes the new process of drying wood in vapour with subsequent impregnation by pressure.

1622. RICHARDSON, N. A. **Wood preservation in Great Britain.** *Proc. UNSCCUR, Lake Success 1949* 5, 1951 (269–70).

1623. KRISHNA, S., and NARAYANAMURTI, D. **Preservation of wood—methods of wood preservation and their uses with special reference to over-all economies in consumption.** *Proc. UNSCCUR, Lake Success, 1949* 5, 1951 (271–6). 19 refs.

Describes briefly results of research and practice in India.

1624. RAY, J. N. **Methods of wood preservation and their uses with reference to over-all economies in consumption.** *Proc. UNSCCUR, Lake Success, 1949* 5, 1951 (276–8).

Discusses methods and chemicals used and the preservation of sleepers, Bamboo tent poles and transmission poles in India.

1625. HARKOM, J. F. **Preservation of wood.** *Proc. UNSCCUR, Lake Success, 1949* 5, 1951 (284–6). 15 refs.

A general account of conditions in Canada.

1626. MANN, R. H. **Wood preservation in the United States and its relation to the conservation of American forests.** *Proc. UNSCCUR, Lake Success, 1949* 5, 1951 (288–9).

1627. HUDDLESTON, G. B. **A case for timber preservation in Australia.** *Aust. Timb. J.* 18 (7), 1952 (482 . . . 492, 500, 506). 8 refs.

Discusses the organisms against which preservation is needed, uses of timber for which preservation is desirable, preservatives available in Australia, and results of service tests on poles, fence posts and sleepers in Australia.

1628. KROGH, P. M. D. **A universal rating for wood preservatives for common purposes.** Forest Products Institute, Pretoria West. 1952. pp. 13. 5 refs. (6th British Commonwealth Forestry Conference, Canada, 1952.)

An endeavour is made to rate preservatives according to their suitability for certain purposes as well as their efficacy under certain conditions, against a life expectancy of 20 years. This should give more satisfactory results than the usual method of rating based solely on length of life.

1629. RENNERFELT, E. **The preservation of wood.** *Proc. UNSCCUR, Lake Success, 1949* 5, 1951 (287).

A brief account of different tests of wood preservatives in Sweden.

1630. ŠTRIKER, R. Novija sredstva za impregnaciju drveta. **[New substances for the impregnation of timber.]** *Drvna Industrija, Zagreb* 2 (6), 1952 (17–8). [Croat.] P.R.

Two formulations have been developed in Jugoslavia as a substitute for imported creosote: (1) 57% spindle oil, 38% mazut (heavy oil residue), and 5% Beech tar oil; (2) 48% spindle oil, 32% mazut, and 20% carbolineum. Their absorption is 80 kg./cu.m., and their fungicidal properties are good.

Poles are sometimes impregnated with salts dissolved out of pyrites. [Cf. *For. Abstr.* 12 (No. 2193).]

1631. Hoek, M. Wolmaniseren op cultuurondernemingen. **[The use of Wolman salts as preservatives in agricultural undertakings [in Indonesia].]** *Bergcultures, Djakarta* 21 (8), 1952 (157 . . 163). [Du.] I.M.I.

Describes the process and equipment, with particular reference to Indonesian conditions, and includes a section on treating Bamboo.

1632. Bavendamm, W., and Bellmann, H. Holzschutzmittel. U-Salze. **[Wood preservatives. Unleachable salts.]** *Holz Roh- u. Werkstoff* 10 (9), 1952 (375–8). 22 refs. [G.] P.R.

Gives chemical characteristics, efficiency, uses, and reactions for unleachable preservatives containing an alkali fluoride, $K_2Cr_2O_7$, and dinitrophenol. Eighteen preservatives of German manufacture are considered.

1633. Sandström, S. Impregnering av virke mot skeppsmask. **[Impregnating timber against teredo.]** *Teknisk Tidskrift, Stockholm* 81 (32), 1951 (693–4). 3 refs. [Sw.] L.S.

Results are tabulated showing the degree of attack by *Teredo navalis* in 1950 on blocks and piles impregnated with Boliden salts and $ZnSO_4$ to total salt contents ranging from 9·3 to 0·9% and placed in position on the west coast of Sweden in 1940–1. Considerable leaching occurred, and a total salt content of 7% is recommended. Impregnated wood should not be placed in contact with unimpregnated wood, because of the risk of attack by full-grown *Teredo*, which are less susceptible to As than the larvae. A period of use at least four times that of unimpregnated wood can be expected. Still better results are expected from a new Boliden preparation, S salt.

1634. McMullen, M. J. **A direct method of detecting boron in timber.** *Tech. Notes For. Comm. (Div. Wood Technol.) N.S.W.* 5 (4), 1951 (12).

When a few drops of a solution of turmeric acid, followed by a few drops of a solution containing HCl and salicylic acids, are added to a wood surface, a brown stain will be produced if the timber contains about 0·1% boric acid or borax, and a very definite bright red stain if it contains not less than 0·2%.

1635. Tewari, M. C., Pande, J. N., and Puroshotam, A. **Testing of wood preservatives. Part 1. Copper-chrome-boric composition.** *Indian For.* 78 (9), 1952 (442–53). 11 refs.

The preservative, which is a modification of ASCU, replacing As_2O_5 by H_3BO_3, was tested in the laboratory and in the field. Results (tabulated) showed that thin veneer specimens treated with this preservative were all sound after lying for two years in the open, while untreated controls were all destroyed in 5–10 months. In order to determine the ratio of H_3BO_3 to $Na_2Cr_2O_7$ for obtaining satisfactory fixation of H_3BO_3, sample blocks were treated with various concentrations and it is concluded that whereas $CuSO_4$ can be fixed in wood when $Na_2Cr_2O_7$ is used in the ratio 1 : 1, for fixation of H_3BO_3 the ratio must be at least 1 : 1·5. It is concluded that this preservative cannot be considered a substitute for ASCU, but can be used in place of Celcure. For treatment of timber for use in dwelling houses and packing cases, it may be preferred to ASCU, which is likely to give off poisonous fumes in case of fire. An absorption of 0·75 to 1·0 lb./cu. ft. for building timbers and 0·5 lb./cu. ft. for packing-case timber can be expected to give satisfactory protection against fungi and insects, including termites.

1636. Meyer, F. J., and Gooch, R. M. **Copper 3-phenylsalicylate—new preservative for special applications to wood.** *Industr. Engng. Chem.* 44 (7), 1952 (1586–9). 2 refs. P.R.

While being effective against stain organisms, moulds, fungi, and termites, this preservative presents no phytotoxicity or health hazard, nor is it a skin irritant or skin sensitizer. It has no odour and imparts no taint.

1637. Hadert, H. Chlorphenole als Holzschutzmittel. **[Chlorinated phenols as wood preservatives.]** *Farbe und Lack, Hannover* 56 (7), 1950 (289–92). 14 refs. [G.] L.S.

A review of the properties and uses of mono-, tri-, tetra- and pentachlorophenol, and Na pentachlorophenate.

1638. Inouye, Y., Nishimoto, K., and Ecchu, K. **Studies on wood preservatives. 5. On the sterilizing power of Pine root oil and its chloride.** *Repr.* from *Wood Res., Kyoto* No. 7, [1952?] (33–44). 6 refs. [Jap.e.]

Studies the relative sterilizing effect on different fungi of 7 distillation fractions and of their chlorinated compounds, and the yields and properties of pinene hydrochloride and pinene pentachlorohydrochloride. The effect of the chlorinated compounds was greater than that of the corresponding untreated fractions (third, second, fourth, and fifth fraction) or equal to it. The yields of pinene hydrochloride and pinene pentachlorohydrochloride were decreased by heating but were almost constant (50–60%) at room temperature. Their melting points were 127 and 147° C. respectively. The sterilizing effect of pinene hydrochloride was 16, and that of pinene pentachlorohydrochloride 80 times that of pinene. [Cf. *For. Abstr.* 13 (No. 4317).]

1639. Botelho, E. A. Novos preservativos de madeiras (ensaios toximétricos). **[New wood preservatives (toxicity tests).]** *Boletim do INT, Rio de Janeiro* 2 (3), 1951 (25–34). 7 refs. [Port.]

Tests were made of (*a*) nitrated and (*b*) chlorated resins distilled from knots of *Araucaria* sp. to find their efficiency as inhibitors of growth in *Polystictus versicolor* and *Fomes connatus* [cf. *For. Abstr.* 13 (No. 3025)]. The toxic properties of the nitrated resin were higher than those of $ZnCl_2$, indicating that it may be a cheap and efficient wood preservative.

1640. **Wood preservation.** *Rep. For. Prod. Res. Bd., Lond. 1951*, 1952 (29–30).

In standard impregnation tests Ramin [*Gonystylus* sp.] and *Pterygota* were found to be permeable and easily treated by pressure or by the open-tank

process; Dahoma [*Piptadenia africana*], Mjombo [*Brachystegia* sp.], Makoré [*Mimusops heckelii*], Yellow Sterculia [*S. oblonga*], Nyankom [*Tarrietia utilis*], *Berlinia*, Peroba [*Aspidosperma* spp. or *Paratecoma peroba*] and Mchenga [*Isoberlinia* sp.] were resistant or very resistant to treatment.

Results of an examination of sleepers after 16 years' service confirm the belief that for creosoting sleepers which contain a mixture of absorbent sapwood and relatively non-absorbent heartwood, e.g. Baltic Redwood, the empty-cell process gives better results than the particular full-cell treatment used by the railways, plus a possible saving in creosote. This was true of both British-grown Scots Pine and Baltic Redwood (both *P. sylvestris*) which gave a very similar performance. British-grown Douglas Fir sleepers were in very good condition and lasted better than any other sleepers; this is believed to be due mainly to the characteristics of the home-grown wood, one of which is the presence of large sound knots that appear to hold the wood together, thus reducing the tendency to split which is characteristic of straight-grained Baltic sleepers.

1641. Rogers, R. T., and Behr, E. A. **A comparison of pentachlorophenol petroleum solutions and coal tar creosote in the pressure treatment of green Southern Yellow Pine poles.** *J. For. Prod. Res. Soc.* 1 (1), 1951 (7–12). P.R.

Results of tests with 5% solutions of pentachlorophenol in petroleum ('preservative 202') and of creosote. Penetration and distribution of 'preservative 202' in steamed green poles are at least as good as in comparable creosote treatments; steaming and vacuum time and the time required for maximum injection are appreciably less.

1642. Schnell, R. L. **Treatability of Shortleaf Pine by the cold soaking method.** *J. For. Prod. Res. Soc.* 2 (2), 1952 (80–4). P.R.

Presents results of tests which show that: (1) the treating time decreases as the diameter of the posts and the temperature of the preservative increase; (2) growth rate has no significant effect on treating time; (3) treating-time efficiency is nearly the same for fuel-oil solutions of Cu naphthenate and pentachlorophenol; (4) average penetration of both these preservatives is excellent. The difficulty of obtaining uniform results by cold soaking is emphasized. Variability can, however, be reduced by making up loads carefully and maintaining continuous control during treatment. Posts should be sorted into groups of nearly uniform diameter and each size should be treated separately. Average treating time of 3-inch posts is about twice that of 4-inch posts.

1643. Dahms, W. G. **Service life of treated and untreated fence posts on the Pringle Falls Experimental Forest.** *Res. Notes Pacif. Nthwest. For. Range Exp. Sta.* No. 80, 1952. pp. 4. 2 refs.

After 16 years in service conditions, 95 and 97% of Lodgepole Pine posts treated with arsenic paste and open-tank creosote respectively were still serviceable, as compared with 24% for posts treated with carbolineum (there is no apparent explanation for this low figure) and 32% for untreated posts. Control posts of Western Red Cedar were all still serviceable after 16 years; 3 of 355 had failed after 19 years.

842. *Treatments to Improve the Resistance of Wood to Physical and Chemical Agencies other than Fire*

1644. Kenaga, D. L., and Sproull, R. C. **Further experiments on dimensional stabilization by allylation.** *J. For. Prod. Res. Soc.* 1 (1), 1951 (28–32). P.R.

Presents the results of studies on the suitability of allylation as an anti-shrink treatment. At low moisture contents, the swelling of treated and control blocks was about the same; the treated blocks, however, reached a point beyond which swelling did not occur. The maximum amount of swelling decreased as the allyl content increased. At relative humidities above 50% the treated material absorbed considerably more water vapour than the controls, but when soaked in water, considerably less. The treated material lost on leaching slightly more weight than the excess weight due to allylation, and the effects of allylation were lost. [Cf. *For. Abstr.* 11 (No. 2931).]

1645. Shimizu, T. **Moisture proofing of wood by treating with acetic anhydride and zinc chloride.** *Journal of the Japanese Forestry Society, Meguro, Tokyo* 32, 1950 (408–13). From *abstr.* in *Rec. Res. Fac. Agric. Univ. Tokyo* No. 1, 1950/51 (1952), (77). [E.]

Chamaecyparis obtusa wood was acetylated at 30% C. with 150 c.c. acetic anhydride, $ZnCl_2$, and 200 c.c. acetic acid to decrease shrinking and swelling, and a study was made on the optimum treating time and amount of $ZnCl_2$ to be used. Results show that optimum treating time ranges from 3–4 days for the addition of 5 g. $ZnCl_2$ to 1–2 days for 25 g. Samples so treated increased from 20 to 40% in weight, and their resistance to moisture was ca. 3 times that of untreated specimens.

1646. Jarreau, F.-R. Procédé de traitement des bois frais. [**Treatment of green wood.**] *French Patent* No. 968,874, May 10, 1950. pp 2. + 2 dgms. [F.] P.R.

Improvement, by ultrasonic waves, in rate of seasoning without deformation, and in resistance to insect and chemical attack.

844. *Attack by Plant Organisms*

844.1. Sap-staining Fungi

1647. Fritz, C. W. **Brown stain and its effect on the strength of Pine poles.** *For. Chron.* 28 (3), 1952 (24–9). 1 ref.

The present study showed that brown stain does not itself reduce the strength of wood, but that other fungi may infect the sapwood under the same conditions (warm and humid) as favour the development of brown stain. The presence of sapstain should therefore act as a warning that the wood has been stored under conditions favouring fungal growth.

1648. THUNELL, B. Einwirkung der Bläue auf die Festigkeitseigenschaften der Kiefer. **[Effect of blue-stain on the strength properties of Pine.]** *Holz Roh- u. Werkstoff* 10 (9), 1952 (362–5). 44 refs. [G.g.] P.R.

Tentative tests have shown that, for wood blue-stained through and through, the bending and compression strength values lie as much as 10% below those for sound wood. The lowering of the work to maximum load may be as much as 30%.

1649. SCHULZ, G. Ein mykologisches Verfahren zur Bewertung fungicider Grundiermittel mit bläuewidriger Wirkung. **[A mycological method for evaluating fungicidal primers having an anti-bluestain effect.]** *Holz Roh- u. Werkstoff* 10 (9), 1952 (353–6). 3 refs. [G.g.] P.R.

A marked stripe is painted with the primer under test on a specially prepared test plate, inoculated with blue-stain fungi. The fungicidal value of the primer is measured by the amount of growth of the blue-stain fungi on the painted stripe, after 3 weeks' storage.

844.2. Wood-destroying Fungi

See also Nos. 1280, 1309, 1316–7, 1538–9, 1599, 1621, 1669.

1650. PEIGNE, D. Catalogue de la mycothèque de la section de mycologie. **[Catalogue of the collection of fungi in the Mycology Section.]** *Broch. docum. Inst. nat. Bois* No. 001, 1952. pp. 5. [F.] P.R.

Lists 113 species or strains cultivated either on pieces of carrot, or on a malt-agar medium.

1651. SCHULZE, B. Untersuchungen über die Virulenz der für die Prüfung der pilzwidrigen Wirkung nach dem 'Klötzchenverfahren' benutzten Normstämme **[An investigation on the virulence of standard strains used in tests of fungicidal effect by the wood-block method.]** *Phytopathologische Zeitschrift, Berlin* 17 (2), 1950/51 (215–7). 4 refs. [G.] O.R.S.

Six common wood-destroying fungi were cultivated (*a*) on malt agar, or (*b*) on malt agar and Pine sapwood alternately. At the end of the period (2–3 months) wood blocks were exposed to attack by the fungi. Fungi cultivated on (*a*) were no less virulent than those cultivated on (*b*).

1652. HUDSON, M. S. ***Poria radiculosa*, a creosote-tolerant organism.** *J. For. Prod. Res. Soc.* 2 (2), 1952 (73–4). 2 refs. P.R.

Weathered, creosoted wood of Southern Pine was inoculated with cultures of *P. radiculosa*, along with several other Pine-decaying fungi often used in tests of treated wood. At the end of 13 months the specimen inoculated with *P. radiculosa* showed about 20% loss whereas the pieces inoculated with other fungi showed only one instance of very slight loss. It is considered that *P. radiculosa* should be further examined as a test organism for evaluating creosote treatments.

1653. SHIMAZONO, H., and TAKUBO, K. **The biochemistry of wood-decaying fungi. (1st report.) The Bavendamm reaction and the accumulation of oxalic acid by wood-decaying fungi.** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 53, 1952 (117–25). 7 refs. [Jap.e.]

Brown- and white-rot fungi, 39 species in all, were studied. [Cf. *For. Abstr.* 13 (No. 4331).]

1654. BAXTER, D. V. **Some resupinate Polypores from the region of the Great Lakes. XXII.** *Pap. Mich. Acad. Sci.* 36, 1950 (1952), (69–83 + 8 plates). 29 refs. L.S.

The main section of the work deals with *Lenzites saepiaria*, a common cause of decay on exposed timber in Europe and N. America, and includes notes on the susceptibility of the fungus to certain chemicals, signs of decay, and prevention and control. [Cf. *For. Abstr.* 13 (No. 2557).]

1655. EECKHOUT, L. E. Duurzaamheidsbepalingen op Kongolese houtsoorten. **[Durability tests of Congolese woods.]** *Meded. Lab. Houttechnol., Gent* No. 9, 1952. pp. 16. 30 refs. [Flem.f.e.g.]

Heartwood of 23 species was subjected to decay by common brown- and white-rot fungi. After 3 months, weight loss was calculated as a % of the original oven-dry weight and compared with weight loss of control samples of Belgian and imported Oak. Results show that some species are more resistant to some fungi and less to others than Oak, and some more resistant than imported while less resistant than native Oak. The following classification was drawn up on the basis of the results: more resistant than Oak, *Mammea africana*, *Erythrophleum guineense*; equally resistant, *Gossweilerodendron balsamiferum*, *Entandrophragma* spp., *Sarcocephalus diderrichii*, *Guarea cedrata*, *Afrormosia elata*, *Tessmannia claessensii*, and *Chlorophora excelsa*; less resistant than Oak, other samples of *C. excelsa*, *Piptadenia africana*, *Melia dubia*, *Petersia africana*, *Chrysophyllum africanum*, *Phyllanthus discoideus*, *Oxystigma oxyphyllum*, *Terminalia superba*, *Macrolobium coeruleoides*, *Turraeanthus africana* and *Staudtia congensis*; and scarcely resistant, *Enantia lebrunii*, *Antiaris welwitschii*, *Ricinodendron africanum* and *Ficus* sp.

1656. RENNERFELT, E. Massaindustrins virkesvårdsproblem. **[Wood storage problems in the pulp industry.]** *Svensk PappTidn.* 55 (16½), 1952 (609–12). 3 refs. [Sw.] P.R.

Discusses the fungi attacking wood during storage, the conditions favouring, and the development of the attack.

1657. TUOVINEN, A. Paperipuiden kuivumisesta ja varastoimisvioista metsävarastoinnin aikana. **[The seasoning of pulpwood and storage defects occurring during forest storage.]** *Julk. Metsäteho, Helsinki* No. 29, 1952. pp. 64. 34 refs. [Fi.e.]

An investigation was made during 1950 on 787 Spruce and 349 Pine logs cut at different times during 1948 and 1949. By May 1950 practically all logs cut and barked not later than June 1949 were seasoned, and those cut in July and August were also seasoned except in cases where the width of the sapwood growth rings exceeded 15 mm. and where, irrespective of ring width, log diameter was at least 17–18cm. Spruce and Pine usually behaved similarly. Pine pulpwood cut during the autumn of 1948 had an average moisture content of 35·5%,

principally because of heavy fungal infection. The density of the cross-wise stacked pile and the position of the logs in the pile had no effect, and log diameter, width of sapwood growth rings and quality of growing site had some effect, on seasoning. An average of 85% of the Spruce logs were blue-stained, though blueing was low in those felled in Sept. and Dec. 1949 (4% and 20% respectively). Pine logs were all blue-stained. Storage rot occurred in an average of 60% of all the Spruce logs, but the rot % per log averaged only 1·4 of rot-infected logs and 0·8% of all logs. The rot % of sapwood of all logs was 1·3. The % of rot-infected logs was higher in the foundation logs of a stack than in the middle or top logs. The average rot % per log for logs felled in different months differed somewhat in loosely stacked and densely stacked piles. Variation of rot damage with growth-ring width varied with the time of felling. Logs with wide growth rings felled early in the year and seasoning slowly, showed heavy rot damage; logs felled in May 1949 seasoned rapidly and growth-ring width had no effect on rot damage. Rot occurred first at the ends of the logs and was less frequent in the middle section. The highest values of rot % occurred in the range 30–50% moisture content. Storage rot in Pine pulpwood was similar to that in Spruce, but more general.

1658. Perilä, O., and Seppälä, E. Pakurikäävän vaikutuksesta koivupuuhun sekä tästä valmistetun sulfiittiselluloosan paperiteknillisiin ominaisuuksiin. **[The effect of *Fomes nigricans* on Birch wood and on the paper-making properties of Birch sulphite pulp.]** *Pap. ja Puu* 34 (10), 1952 (359–65). 16 refs. [Fi.e.] P.R.

Analyses of sound and decayed wood showed that the fungus destroys primarily the readily hydrolysed carbohydrates and cellulose, and to a certain extent the lignin. Remaining cellulose is little changed, at least in the early stage of decay. Changes noted in the behaviour of the lignin as a result of the fungus attack indicate that it may have been freed from chemical or other bonds in the wood or that de-polymerization has occurred. During sulphite pulping, the lignin of decayed wood dissolved less easily than that of sound wood, suggesting that, 'freed' by the action of the fungus, it condenses more easily. In this respect, the action of the fungus has the same effect as an acid pre-treatment on the sulphite cook. As a result of decay the strength and resistance to mechanical treatment of the cellulose fibres were considerably lessened although the cellulose molecules did not seem to be much damaged, at least in the first stage of decay. Decayed wood darkened the pulp, but with additional chlorine this could be bleached satisfactorily. The colour would limit the use of unbleached paper pulp from decayed wood, while the bleached pulp made paper of inferior strength. Tearing and folding strengths were particularly decreased; but these properties, even with sound wood, are much lower for Birch than for softwood pulps.

1659. Höpner, T. Pilzschäden am Zellstoffholz. **[Fungus damage in wood for chemical pulping.]** *Papier, Darmstadt* 6 (3/4), 1952 (47–53). 13 refs. [G.g.] L.S.

A brief review of recent work is followed by an illustrated (photomicrograph) and tabulated description of results of the author's own investigations on sound and brown-rot-infected Spruce wood, dealing with the spread of fungal hyphae in wood, the blocking of cells in the peripheral zone of the attack, as well as dissolution phenomena in fibres and fibre bundles. Gives several microscopic characteristics of the cellulose obtained from wood attacked by brown rot. The changes occurring in the wood substance are followed by means of: colour, density, Cu number, and solubility in alkali. An attempt is made to give a theoretical explanation of the relationships observed, particularly the effect of fungal decay on the yield of sulphite cooking and on the chemical and mechanical properties of the pulp. *From author's summary.*

1660. Černaev, P. Natrăpvane i gniene na bukovite materiali v gorata i văzmožnosti za tjahnoto zapazvane. **[Dote and decay of Beech timber in forests and the possibility of its preservation.]** *Sbornik na Centralnija Gorski Izsledovatelski Institut, Sofia* 4, 1948 (59–76). 18 refs. [Bulg.russ.f.]

Experiments carried out in 1943 in one of the Bulgarian State forests showed that Buchenschutzmittel (an I.G. Farbenindustrie A.G. product of coal distillation) and Beech-wood tar (also its creosote fraction) gave good results as Beech-log preservatives, while Wolman salts (kind not specified) were less satisfactory. More than 50% of controls were decayed after one year's storage in the forest.

845. *Attack by Animals*

845.1. Marine Borers

See also No. 1633.

1661. Vergelijkend onderzoek naar de duurzaamheid tegen paalworm van tropische hout in Nederland, dertiende verslag. **[Comparative investigation on the resistance to marine-borer attack of tropical woods in the Netherlands, 13th report.]** *Meded. Inst. Trop. Amst.* No. 98 (*Afd. trop. Prod.* No. 38) 1952 (26–30, 66). 4 refs. [Du.e.] L.S.

A progress report on tests of the durability of *Ocotea rubra*, *Parinari scabra*, *Intsia* spp., *Lophira procera*, *Shorea* spp., *Ocotea rodiaei*, *Mora excelsa*, *Dicorynia paraënsis*, *Paratecoma peroba*, *Eusideroxylon zwageri*, *Pseudotsuga taxifolia*, *Quercus* sp. and *Populus* sp. [Cf. *For. Abstr.* 10 (No. 304).]

845.2. Terrestrial Borers

1662. Tooke, F. G. C. **The incidence and control of wood-destroying insects in South Africa.** Government Printer, Pretoria. 1952. pp. 8. 6 refs. (6th British Commonwealth Forestry Conference, Canada, 1952.)

1663. Sallenave, P. **Protection of logs after felling in tropical forests.** *Proc. UNSCCUR, Lake Success, 1949* 5, 1951 (279–82). 11 refs.

Results of an experiment on the protection of *Terminalia superba* with Cryptogil EA6. [Cf. *For. Abstr.* 11 (No. 388).]

1664. STRASZEWSKA, S. Protection du bois contre les insectes xylophages. Toxicité des vapeurs de diverses préparations commerciales. [**The protection of wood against insect borers. The toxicity of the vapours of several commercial preparations.**] *Bull. agric. Congo belge* 43 (3), 1952 (808–16). [F.flem.]

The value as respiratory poisons of a number of insecticides containing (1) pentachlorphenols, (2) monochlornaphthalenes was tested. The vapours from (1) had no toxicity to insects, but several of group (2) were extremely effective.

1665. FISHER, R. C., and THOMPSON, G. H. **Recent developments in the prevention of attack by ambrosia (pinhole borer) beetles in standing trees and logs.** Department of Scientific and Industrial Research, London. 1952. pp. 16. 35 refs. (6th British Commonwealth Forestry Conference, Canada, 1952.)

The defect in timber commonly referred to as pinworm, shotworm, pinhole or shothole borer damage, continues to be responsible for serious degrade and restriction in uses of many valuable timbers, particularly from the tropics. A brief general account is given of existing knowledge of the habits of the ambrosia (pinhole borer) beetles, of the families Platypodidae and Scolytidae, responsible for this defect, and of the conditions in trees and logs inviting attack. It is suggested that to fall into line with the practice in other countries, the name 'ambrosia beetles' be adopted universally throughout the British Commonwealth for the insects responsible. Recent developments in the assessment of losses and in the prevention of attack by treatment of logs immediately after felling with certain formulations of the newer insecticides BHC and DDT, are described, with special reference to the results of experimental work in the Gold Coast and Malaya. The need is shown for continuation and expansion of this work and for greatly increased knowledge of the identity, biology and ecology of ambrosia beetles. A summary is given of a proposed investigation on these insects in West Africa, planned to seek and develop improved methods of control, and emphasis is laid on the need in this work for close co-operation between specialist, forest officer and timber firm. *From authors' summary.*

1666. BROWNE, F. G. **Suggestions for future research in the control of ambrosia beetles.** Government Printer, Kuala Lumpur. 1952. pp. 10. 10 refs. (6th British Commonwealth Forestry Conference Canada, 1952.)

Investigations of numerous insecticides and preservatives for the control of ambrosia beetles indicate that, although some of these show promise, their use is always expensive and frequently impracticable. It is suggested that better and cheaper control may result from a study of the initial source of attraction of ambrosia beetles to their host. Present knowledge of this subject is discussed. *Author's summary.*

1667. YANAGISAWA, T. **The control of bark-beetles and some other harmful insects on Ezo-Spruce and Todo-Fir by DDT.** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 53, 1952 (103–16). [Jap.e.]

Logs of Todo Fir [*Abies mayriana*] and Ezo Spruce [*Picea jezoensis*] were sprayed on the bark surface with a 5% DDT solution. DDT was found to act as a repellent to barkbeetles (*Polygraphus proximus* on Todo Fir and *Ips typographus* and *P. jezoensis* on Ezo Spruce). On the average of 3 years experiments the number of egg-laying tunnels in logs sprayed with DDT was about 17% of those in untreated logs. In the untreated logs, adults developed by autumn and emerged before winter; in the treated logs larvae developed by autumn, but no adults emerged from the logs. Larval tunnels of longhorn beetles (*Monochamus grandis, M. rosenmülleri, Tetropium castaneum gracilicorne* and others) in treated logs of Fir and Spruce were only 17·3% and 31·6% respectively of those in untreated logs. Larval tunnels of *Pissodes cembrae* in treated logs of Fir and Spruce respectively were 71·6 and 39·7% of those in untreated logs. Egg-laying was also reduced. The effect of the DDT lasted for about 3 weeks, the logs being re-invaded after that period. The effect of DDT on ambrosia beetles (*Trypodendron proximum* and *T. linearum*) was not clear on either tree species.

1668. SIMPSON, L. J. **Prevention of damage by borers in softwood logs or fire-killed timber.** Division of Forest Biology, Department of Agriculture, Ottawa. 1951. pp. 5.

Softwood logs stored in timberyards or skidways can be protected from *Monochamus scutellatus* by spraying with a mixture of ½ lb. technical DDT/1 gal. fuel oil.

1669. JACQUIOT, C. **The main problems of timber protection in France.** *Proc. UNSCCUR. Lake Success, 1949* 5, 1951 (283–4).

Discusses measures taken to prevent damage by *Stereum* spp. to felled timber left in the forest, by *Platypus cylindrus* and *Xyleborus monographus* to Oak logs, and by *Hylotrupes bajulus* in buildings.

1670. TRÄGÅRDH, I. Husbocken och andra inomhus förekommande virkesförstörande insekter samt medlen att bekämpa desamma. [***Hylotrupes bajulus* and other wood-destroying insects found in buildings, with methods of control.**] *Publikationer, Kungl. Byggnadsstyrelse, Stockholm* No. 1, 1949 (1950). pp. 49. 14 refs. [Sw.] Price *Kr.*1. I.I.E.

Describes *Monochamus sutor, Sirex gigas, Callidium violaceum, Ernobius mollis, Hylotrupes bajulus, Anobium striatum, A. pertinax*, and *Lyctus canaliculatus*, with a key to their identification from the appearance of tunnels and flight holes; gives figures for their distribution in Sweden and the frequency of attack in different parts of buildings and in buildings of different ages; and discusses methods of prevention by inspection of timber used, eradication of breeding centres and by impregnation of timber, and of control by removal of infected wood, by use of insecticidal paints, and by gas or hot air.

1671. **Investigations with insecticidal smokes [against *Anobium punctatum*] in buildings.** *Rep. For. Prod. Res. Bd., Lond. 1951*, 1952 (39).

BHC smoke was liberated from a commercial generator suitable for use in domestic premises, in a room of 650 cu. ft. capacity. Some 250 specimens of *A. punctatum* collected at random and of unknown

age and egg-laying capacity were liberated 1 hr. before treatment. Collection and examination 17 hrs. later showed that all were dead. Other batches of beetles were introduced for 17 hrs., 4 and 13 days after the smoke had been released. Not all were killed but none laid eggs, although controls survived and laid eggs. A residual effect was also obtained when beetles were placed in contact with treated surfaces up to 19 days after exposure to smoke; such effect was confined mainly to upper horizontal, and vertical surfaces. [Cf. *For. Abstr.* 13 (No. 4346).]

845.3. Termites

See also No. 1524.

1672. Snyder, T. E. **Detection of termites by microphones.** *Pest Control* 20 (7), 1952 (33–4). 4 refs. D.S.I.R.

Describes and discusses briefly the value of microphones developed for the purpose since 1928. An inexpensive, effective instrument has still to be developed.

1673. St. George, R. A. **Testing soil poisons for termite control, Part II.** *Pest Control* 20 (6), 1952 (32). D.S.I.R.

Describes standardized field test procedures and some test results.

1674. Lutte chimique contre les termites. **[Chemical control of termites.]** *Rapp. Inst. nat. Étude agron. Congo belge 1951*, 1952 (124–5). [F.]

Injection of a liquid mixture containing 90% *o*-dichlorobenzene, 5% BHC, and 5% pentachlorophenol into termitaries of *Macrotermes natalensis*, checked an attack and the effect lasted for 18 months. Injection of a mixture of dichlorpropane and dichlorpropylene gave promising results; after the injection of 200–400 cu.cm. no signs of life were seen in the termitary for 8 days.

846. *Steaming*

See Nos. 1539, 1683, 1689.

847. *Drying* (*Seasoning*)

See also Nos. 1269, 1580, 1657, 1717.

1675. Bateson, R. G. **Timber drying and the behaviour of seasoned timber in use.** Crosby Lockwood & Son Ltd., London. 3rd ed., 1952. pp. xiii + 143 + 7 plates. Price 15*s*.

[Cf. *For. Abstr.* 8 (No. 2601).] A completely revised edition.

1676. Sergovskiĭ, P. S. Metod rasčeta processov suški i uvlažnenija drevesiny. **[Method of calculating the processes of wood seasoning and conditioning.]** *Lesn. Prom.* 11 (3), 1951 (22–6). [Russ.]

Suggests a new method, based on theoretical equations and on the author's own experimental data. Distinguishes between the equilibrium moisture content (eq.m.c.) which is the m.c. finally attained by comminuted wood fibres in given air conditions, and the 'persistent' moisture content (pers.m.c.) which is the m.c. attained by a wood specimen of given dimensions. Eq.m.c. will be practically the same irrespective of whether it is arrived at by drying or by humidifying; on the other hand, while pers. m.c. attained by drying is nearly equal to eq.m.c., that attained by humidifying is less than the eq.m.c. by the magnitude of the coefficient of absorption hysteresis, the latter increasing with the timber dimensions up to ca. 2·5% m.c. for pieces 50 mm. long and 8 mm. thick, after which it remains fairly constant. The author suggests the following simplified equation for evaluating the duration of seasoning (z) for a board of thickness s, moisture conductivity coefficient D, initial moisture content W_{in}, final moisture content W_f, and equilibrium moisture content W_{eq}

$$z = \frac{s^2}{\pi^2 D} \log \text{nat} \frac{W_{in} - W_{eq}}{W_f - W_{eq}}$$

This equation has been developed for an endless board. For timber of rectangular section, provided its length is not less than 50–80 cm., the thickness s can be replaced by the 'hydraulic' radius $R = sb/(s + b)$, where b is the width of timber. The final equation is

$$z = 2{\cdot}67 \times 10^{-6} \times R^2/D \times \log E$$

where E is $(W_{in} - W_{eq})/(W_f - W_{eq})$ for seasoning and $(W_{pers} - W_{in})/(W_{pers} - W_f)$ for the humidification. The value of the coefficient of moisture conductivity (D) depends on the species and temperature. The D/temperature curves are given for Pine, Birch, and Oak heartwood. A nomograph is given for evaluating z without tedious calculations.

1677. Berkel, A., and Toker, R. Meşe, kayın, gürgen ve kestane yakacak odunlarında muhtelif şartlar altında kuruma ile husule gelen fire hakkında bir deneme. **[An experiment on loss of weight during the drying of fuel of Oak, Beech and Hornbeam species, and of Sweet Chestnut, under different conditions [of storage].]** *Istanbul Üniv. Orm. Fak. Derg.* 1*B* (2), 1951 (8–12 + 1 tbl.). [Turk.]

Includes a table showing the monthly loss of moisture from the green state over 12 to 17 months.

1678. Vagonet s mehaničkim uređajem za dizanje i spuštanje tereta—nova racionalizacija u postupku parenja i sušenja drveta. **[Kiln-trolley with a mechanical device for lifting and lowering the load—a new rationalization in the processes of timber steaming and seasoning.]** *Drvna Industrija, Zagreb* 3 (3), 1952 (8–9). [Croat.]

Illustrated description of a prototype kiln-trolley designed and built in Jugoslavia. Strong wooden beams are placed on either side of the narrow-gauge track, and the timber is stacked on them. The trolley then moves under the stack which is lowered by means of two hand-operated levers (screw-jacks), transported to the kiln and there lifted on to two similar beams by means of similar screw-jacks. Thus one bogey can be used for a number of kilns.

1679. Hoffman, W. P. **Wood conditioning process.** *U.S. Patent* No. 2,534,714, Dec. 19, 1950. pp. 2. P.O.

A batch of cut wood is placed in a closed compartment and refrigerated at + 10 to − 5° F., the sap and

moisture being quickly frozen. This temperature is held for ca. 12 hours, after which the wood is removed to another compartment which is heated to melt the ice and evaporate the liquid until the wood is dried.

1680. STEVENS, W. C. **Timber drying in superheated steam.** *Timb. & Plyw.* 103 (2671), 1952 (477, 482). P.R.

Principles involved in high-temperature (superheated steam) seasoning of wood, and its applicability to seasoning of hardwoods and softwoods.

1681. **Seasoning in superheated steam.** *Rep. For. Prod. Res. Bd., Lond. 1951*, 1952 (11).

Some test runs have been made in a small experimental chamber in which wood was subjected to steam at atmospheric pressure but at temperatures above the b.p. of water, the superheating being accomplished by electrical heating elements. With samples of Beech dried at different temperatures considerable shrinkage and surface splitting occurred. Other woods, including African Mahogany, Obeche and Gaboon were tested, and although more promising results were obtained with the 'soft hardwoods' than with Beech, shrinkage and case hardening were usually greater than with normal kiln schedules. An increase in shrinkage is usually associated with increased distortion, and timber apt to collapse would be likely to do so when subjected to such high temperatures.

1682. KOLLMANN, F.; MALMQUIST, L. Untersuchungen über die Trocknung von Kiefernschnittholz mit erhöhten Temperaturen. **[Research on seasoning sawn Pine timber at high temperatures.]** *Medd. svenska TräforsknInst. (Trätekn. Avd.)* No. 23, 1952. pp. 39. 34 refs. [G.] P.R.

Seasoning experiments were made using 12 schedules with average temperatures ranging from 60 to 113° C. Results, including final moisture contents, time and rate of drying, seasoning defects and colour, and the theoretical aspects of high-temperature seasoning are discussed. Results include the following: (1) There is no relationship between checking and temperature, but a relationship exists between the number of internal and of external checks. The risk of checking was no greater at temperatures over 100°. (2) No discoloration visible to the naked eye was found in planks seasoned at 60–80°, there was slight browning at 80–90° and marked browning at 90–105°. (3) Photospectrographic measurements of reflectivity showed that discoloration is more closely related to the humidity of the wood and the air than to seasoning temperature. (4) Tight sound knots were not loosened by seasoning at 100° and over.

1683. STURANY, H. Trocknung im reinen Heissdampf. **[Seasoning in pure hot steam.]** *Holz Roh- u. Werkstoff* 10 (9), 1952 (358–62). 8 refs. [G.g.] P.R.

Some conclusions are drawn from a modified graph showing moisture-content weights for temperatures above 100° C. Seasoning in pure hot steam requires a very vigorous circulation of the seasoning medium. A hot-steam drier is described in which an automatic reversal of circulation keeps the temperature differences within the stack to a minimum.

1684. **High temperature kilns.** *Timb. Tr. J.* 202 (3967), 1952 (1957–8).

Extracts from a brochure published by Bachrich Patents Ltd., manufacturers of timber drying kilns, Harrow Road, London, W.2, on kilns in general, and high-temperature and high-speed kilns in particular.

1685. ANDERSSON, E. Värmeekonomin vid virkestorkning. **[Heat economy in drying timber.]** *Pap. ja Puu* 34 (9), 1952 (319–32). 22 refs. [Sw.e.] P.R.

Investigations were made on a compartment kiln, progressive kilns with and without heat recovery and a high-temperature kiln. The species dried was 1-in. Scots Pine with a moisture content of 90% before and 12% after drying. Results for summer and winter conditions given in graphs and tables, show that: (1) the total heat consumption is roughly the same for all the kilns, but the compartment kiln has a slightly higher consumption than the others, especially in winter. Radiation losses are rather high (12·0% in summer and 16·7% in winter) for the compartment kiln. With the continuous kiln most of the heat loss caused by heating the wall structure, machinery etc., was avoided, and radiation losses were lower than for the compartment kiln; the heat needed to raise the temperature of the incoming air was reduced, especially in the kiln with a heat recovery plant. The high-temperature kiln showed very low values for air heating and radiation loss. A general analysis of heat consumption in kiln drying showed that total heat required can never be below, and will generally be higher than, the heat of vaporization of water.

1686. **Drying by boiling in oil.** *Rep. For. Prod. Res. Bd., Lond. 1951*, 1952 (11–2).

In exploratory tests, Beech and Oak dried rapidly when boiled in oil but both shrank abnormally and tended to suffer serious degrade. The samples of Oak were virtually useless. Damage to Beech was less serious, and it appears that small pieces of relatively permeable woods might be dried satisfactorily but that the method would have no general value.

848. *Timberyard Practice. Handling and Storage of Timber*

See also Nos. 936–8, 1572.

1687. **Timber handling: new design for machine to cover conveying and piling.** *Timb. Tr. J.* 203 (3977), 1952 (1492).

Describes a model of a machine for handling timber at the docks and in large timber yards. It is basically a mobile crane: the cradle, which incorporates a mechanism for clamping the timber in position, is linked tightly to the special double jib-members so that it moves up and down the length of the jib, but remains with its lower arms in a horizontal plane whatever the jib angle.

85. GRADING OF WOOD AND WOOD PRODUCTS

852. *Detection, Recognition and Assessment of Injuries and Defects*

See also Nos. 937, 1279, 1282–3, 1530, 1566, 1585.

1688. MEYER, H. Gegenüberstellung von feinborkigen und grobborkigen Fichtentypen in bezug auf Ästigkeit und Holzqualität. **[Comparison of smooth- and rough-barked types of Spruce as regards knottiness and timber quality.]** *Abstr.* in *Z. Forstgenet.* 2 (1), 1952 (22). [G.]

Occlusion of wounds left by dead branches is slower on rough-barked (*r*) than on smoothed-barked (*s*) trees. Up to a stem height of 9 m. there is a greater proportion of knots in a cross-section of each whorl in *r* trees than in *s* ones. Average values for each whorl in 100-year-old trees are: loose knots—*r* 56·3%, *s* 19·9%; tight knots—*r* 41·1%, *s* 41·6%; knot-free—*r* 2·6%, *s* 38·5%.

1689. KISSER, J., and STEININGER, A. Die Mikroskopie im Dienste der Oberflächenbehandlung von Holz. **[Microscopy in the service of surface finishing of wood.]** *Mitt. öst. Ges. Holzforsch.* 4 (4), 1952 (7–11). 6 refs. [G.g.] P.R.

Light-coloured markings in veneer of *Swietenia macrophylla* after filling and polishing, were found to be crystalline deposits of CaC_2O_4 in the vessels. When they were disturbed by the knife during the veneer-cutting process, the fragments were removed during finishing, but intact deposits were not. The deposits were less noticeable when the veneer was cut at an angle to the grain so that the deposits were either cut through and dispersed or left unexposed, and also when the veneer was moistened with lukewarm water before sanding, causing a relaxation of the bond between the vessel walls and the crystals. Discoloration of the underside of Oak veneers was found to be caused by the accumulation and subsequent oxidation of tannin in the cells damaged during the veneer-cutting process; the knife damage to the cell is always greater on the under surface, because of the greater strain there. Both damage and discoloration can be reduced by thoroughly steaming the wood before cutting.

853. *Grading of Logs*

See also Nos. 1575–6.

1690. MAYER-WEGELIN, H. Die neuere Entwicklung der Verwertung und Sortierung des Buchenstammholzes. **[Recent developments in the utilization and grading of Beech stem timber.]** *Forstarchiv* 22 (11/12), 1951 (161–5). 2 refs. [G.g.]

Gives data (for 1927 and 1950) from the Hildesheim Beech region, N. Germany, to illustrate the rise of the rotary-cut veneer industry to the position of most important consumer of large Beech timber, emphasizes the possibility of efficient grading at the felling site, and urges some adjustment and subdivision of the present log grades in the interests of proper utilization and a more equitable price scale.

1691. BUNCE, D. **A graph for quality assessment: a method for determining the fair average quality of African hardwoods.** *Wood* 17 (9), 1952 (350).

Describes the use of a graph to discover the % difference from fair average quality (Grade A 40%, B 40%, C 20%, giving a total of 8400 points where A is rated at 100, B at 80 and C at 60 points) in a parcel of African hardwoods where the % of Grade A and Grade C are known.

1692. CERMAK, F., and ZENATY, J. G. Les méthodes actuelles de la réception des grumes en A.E.F.] **[Current standards for the acceptance of logs in French Equatorial Africa.]** *Bois For. Trop.* No. 20, 1951 (209–26 + 8 photos). [F.e.span.]

The authors describe an ideal log of Okoumé and the various defects actually found, and discuss in detail the current grading rules and standards of acceptance for logs for export. Other species are discussed more briefly.

1693. CERMAK, F., and ZENATY, J. G. **Log grading in Gaboon.** *Wood* 17 (6–9), 1952 (221–3; 262–5; 304–6; 342–3). *Transl.* from *Bois For. Trop.* No. 20, 1951.

A translation of the article dealt with in the preceding abstract.

854. *Grading of Converted Timber*

See also Nos. 1575–6.

1694. BROWN, N. C. **North American grading rules [for converted timber]: some questions and answers on important points.** *Wood* 17 (11), 1952 (428–30).

Discusses the basis of grading and the meaning of the different grading terms for hardwoods and softwoods.

1695. KOLLMANN, F. F. P. **Selection, testing and properties of wood and laminated wood for highly stressed structural parts.** *Journal of the Aeronautical Society of India, New Delhi* 4 (1), 1952 (1–26). L.A.S.

Selection should be based on the following mechanical tests; modulus of elasticity; tensile, compression, buckling and bending strength; also impact work, and torsion and shear strength. Graphs and diagrams are presented from various sources, illustrating the differences in properties of solid and laminated wood, and the relationships between the mechanical properties of wood and its density, moisture content and grain angle.

86. PULP INDUSTRIES. CHEMICAL UTILIZATION OF WOOD

1696. PUNTAMBEKAR, S. V. **Chemical utilization of Indian forest products.** Forest Research Institute, Dehra Dun. 1952. pp. 6. (6th British Commonwealth Forestry Conference, Canada, 1952.)

Enumerates examples of Indian forest products (including wood) that have been converted into industrial products by chemical processes.

1697. HOLZER, W. F. **The chemical utilization of wood in the United States.** *Proc. UNSCCUR, Lake Success, 1949* 5, 1951 (292–6). 28 refs.

861. *Paper and Cardboard Industry* (*Pulp, Paper, Cardboard, Fibreboards*)

See also Nos. 1228, 1470–1, 1475, 1611, 1656–9.

1698. **List of publications on pulp and paper.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*444, 1952. pp. 40. P.R.

1699. THIESMEYER, L. R. **The effects of pulp and paper manufacturing developments on forest utilization.** [Pulp and Paper Research Institute of Canada, Montreal?] 1952. pp. 14. (6th British Commonwealth Forestry Conference, Canada, 1952.)

Pulping and Pulp

1700. BHAT, R. V. **New cellulosic raw materials for the Indian paper and board industry.** Forest Research Institute, Dehra Dun. 1952. pp. 4. (6th British Commonwealth Forestry Conference, Canada, 1952.)

Cf. *For. Abstr.* 14 (Nos. 828–30).

1701. **Crin Végétal as a raw material for paper manufacture.** *Information Bulletin, British Paper and Board Industry Research Association, Kenley, Surrey* No. 2, 1952. pp. 3. P.R.

Presents results of tests on Crin Végétal (*Hyphaene thebaica*) from Morocco. Fibres in its pulp are longer (ca. 1·33 mm.) and more slender (diam. ca. 0·008 mm.) than esparto fibres. The pulp produces sheets of high bulk, markedly superior to esparto sheets in strength properties. Pulping and bleaching are, however, more difficult than with esparto, and pulp yields are less; the latter is offset by the lower price of the raw material.

1702. LØSCHBRANDT, F. Tropiske fibermaterialer til treforedlingsindustri. [**Tropical fibre materials for pulp.**] *Norsk Skogind.* 6 (8), 1952 (226–41). [Nor.e.] P.R.

Reviews sources of raw material in different tropical and subtropical areas and discusses the properties and pulping characteristics of Parana Pine, *Eucalyptus* spp., Bamboos, bagasse and mixed species.

1703. CHITTENDEN, A. E., COOMBER, H. E., and MORTON, D. ***Brachystegia* wood from Tanganyika as a paper making material. Part II. Botanical identification and pulping trials by the sulphite and sulphate processes.** *Colon. Plant Anim. Prod.* 2 (4), 1951 (292–6).

The samples already tested [cf. *For. Abstr.* 13 (No. 2603)] have been identified as *Brachystegia longifolia* and *Julbernardia* [*Isoberlinia*] *globiflora*. *B. longifolia* could only be pulped satisfactorily by the sulphite method at high temperatures and pressures, with liquors of a high sulphite content; the pulps were of a dark brown colour and full of shive, and papers were very dark brown, full of fine shive, rather soft and bulky, and very weak. *J. globiflora* was not tested by this method. Equal parts of the two species were pulped by the sulphate method. The unbeaten unbleached pulp nearly equalled unbleached *B. longifolia* soda pulp in breaking length and burst factor and was appreciably stronger than *J. globiflora* soda pulp. Beating the sulphate pulp for 2 hours gave a paper stronger in all respects than either of the soda pulps after an equal beating period. Generally both the beaten and unbeaten sulphate pulps contained less shive, were slightly darker in colour and rather softer and bulkier than the corresponding soda pulps. Results are tabulated.

1704. MURTO, J. O. Suomen puu selluloosan ja paperin raaka-aineena. [**Finnish wood as raw material for pulp and paper.**] *Pap. ja Puu* 34 (6–9), 1952 (237–40; 267–74; 301–6; 343–51). [Fi.e.] P.R.

An account of research work by Oy Keskuslaboratorio. Spruce, Pine and Birch were investigated in research on the quality of sulphite and sulphate pulpwood. Forest type and crown class were shown to be less important than the geographical location of the forest and the position of the wood in the tree, especially for Pine. North Finnish Pine contains a rather large proportion of resin and there is, therefore, a somewhat higher alkali requirement in the sulphate cooking process. *From author's summary.*

1705. YONEZAKA, Y., KIKUCHI, F., and INOMATA, T. **Studies on pulp from sawdust.** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 53, 1952 (59–68). [Jap.e.]

An investigation shows that about 20% of sawdust in Japan is not used. Sawdust larger than 40 mesh is considered suitable for pulp; sulphate pulp from sawdust over 20 mesh was smaller in yield, a little lower in tensile, bursting and tearing strengths and very much lower in folding strength than normal pulp. Nitric acid pulp for viscose from sawdust, like rayon pulp, was useful as a binder in plywood manufacture. A suitable mixture is equal parts of sawdust pulp and normal pulp. Softwood sawdust pulp should be used for paper making and that from hardwood for viscose.

1706. NEALE, F. R. **The brightening of Eucalypt groundwood by zinc hydrosulphite.** *Paper Tr. J.* 135 (11), 1952 (26, 28, 30–1). 18 refs. P.R.

Maximum brightening was obtained using the following procedure. Groundwood pitstock was partially neutralized before brightening, using sufficient NaOH to give pH 4·5 after the addition of (0·8 to 1%) of Zn hydrosulphite. When the reaction with the latter was completed, the groundwood was acidified to pH 2·6 with H_2SO_4 and washed well. The brightened groundwood was neutralized to about pH 5 before papermaking was commenced. The optimum temperature was slightly above 50° C. *From author's summary.*

1707. MCGOVERN, J. N., MARTIN, J. S., and KINGSBURY, R. M. **Semichemical pulping characteristics of Pacific coast Red Alder, Douglas-Fir, Western Redcedar, and Western Hemlock.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1912, 1951. pp. 10 + 4 gphs + 10 tbls. 8 refs. P.R.

The Alder gave neutral sulphite pulps suitable for container boards and bleached-paper products. Pulps made from Western Red Cedar and Western Hemlock had considerable promise for use in paperboard, that made from Douglas Fir somewhat less promise. Sulphate semichemical pulps made from Alder and old-growth Douglas Fir had lower chemical requirements, lower bursting strength and higher

folding endurance than their neutral counterparts. Strong, bleached, neutral sulphite pulps can be produced in yields of 55% from Alder and 50% from second-growth Douglas Fir. *From authors' summary.*

1708. NOLAN, W. J., and BROWN, W. F. **Experimental development of high-speed continuous alkaline pulping.** *Pulp Paper Mag. Can.* 53 (9), 1952 (98–110).

The alkaline pulping variables of concentration, temperature and time are studied and their effect on cooking Slash Pine and Turkey Oak presented. A solid/liquid interface theory of pulping was suggested as the mechanism of the pulping reaction. Use of constant cooking temperature and sustained concentration increased reaction rates so much that increased chip surface area was needed for efficient pulping. Methods of producing this by mechanical pretreatment are discussed, and the effects on fibre strength are presented. Such pretreatment results in pulps of higher yield and shorter cooking time when cooked by conventional batch methods, than when mill-size chips are used. Use of mechanical pretreatment, constant temperature and sustained concentration gave high-quality pulp of good yield after 15 min. cooking or less. A definite relationship was found between concentration of alkali and pentosan % in the pulp. It is possible to produce pulps of very low pentosan content by pulping at a constant concentration of 50–80 g./litre without acid prehydrolysis. Data on the pulping conditions that yield pulps of high purity from Turkey Oak are presented; also preliminary strength data for Slash Pine pulps cooked under constant conditions and mechanical pretreatment of the chips. *From authors' abstract.*

1709. VALEUR, C. Vedfuktighetens betydelse för kvalitet och utbyte vid sulfatkokning. **[The influence of wood moisture on quality and yield from sulphate pulping.]** *Svensk PappTidn.* 55 (20), 1952 (776–83). 3 refs. [Sw.e.g.] P.R.

A series of pulping experiments was made on Pine logs stored and chipped wet or dry, and on moistened chips. Results are tabulated. Wood that is moist when fed to the digester gives the same result irrespective of whether it has been dried and resoaked, and of its moisture content at chipping. Dry unsteamed wood gives pulp of only slightly lower strength than moist wood. Dry wood also appears to give a higher % of screening rejects. If dry wood is thoroughly steamed before cooking it behaves like moist wood. It is pointed out that mill results, where other factors are involved, may be more complicated than those obtained in the laboratory.

1710. JANOVSKIĬ, V. V., and MALEVSKAJA, S. S. Polučenie drevesnoĭ celljulozy pri pomošči organičeskih rastvoriteleĭ. **[Preparation of wood cellulose by means of organic solvents.]** *Žurnal Prikladnoĭ Himii, Moskva* 24 (10), 1951 (1100–8). 7 refs. [Russ.] D.S.I.R.

Hardwood (Aspen and Birch) sawdust, when cooked with ethylene glycol, gave a pulp yield of 54–57·63% and with ethyl glycol 41·8–42·4. Hardwood chips when cooked with ethyl glycol gave 32–57·06, with butanol, 45·6–52·5, and with amyl alcohol, 45·6–55·6%. The delignification of Pine chips with butanol was slow and accompanied by a destruction of a considerable part of the carbohydrate portion; the pulp yield was 27·9%. The mechanical strength of fibres was good in most cases. Best results were obtained with ethyl glycol.

1711. MARTIN, M. E., and SHERK, D. L. (to Celanese Corporation of America). **Two-step digestion of wood with aliphatic acid.** *U.S. Patent* No. 2,601,408, June 24, 1952. pp. 2. P.O.

Wood is digested for 5–60 mins. at 150–160° C. with 50–70% by weight of an aqueous solution of a lower aliphatic acid (acetic, propionic, or butyric) with or without the addition of 0·5–1% of H_3PO_4; the digested material is recovered and subjected to at least one additional digestion for 5–60 mins. at 150–160° with 30–40% by weight of the same solution.

1712. HÄGGLUND, E. **Improved pulping processes—utilization of waste liquors.** *Proc. UNSCCUR, Lake Success, 1949,* 5, 1951 (289–91).

A short review of technical developments in different countries.

Fibreboards

See also Nos. 1588, 1608–10.

1713. MILLER, H. **Wood waste and resin products, their application and physical properties.** *J. For. Prod. Res. Soc.* 1 (1), 1951 (145–9). P.R.

Compares (*a*) the more important strength characteristics of a general-purpose product with those of Douglas Fir timber and plywood, and phenolic plastic; (*b*) a variety of such products with several timbers, Masonite and other competitive products.

1714. CAUGHEY, R. A. **Two views on boards from waste. Second—development of synthetic boards from wood waste.** *Chemurgic Digest, Columbus, Ohio* 9 (11), 1950 (9). D.S.I.R.

Deals with the use of sawdust and shavings as synthetic board materials, with special reference to a new type of board produced in the U.S.A. as an underlay for linoleum, asphalt or rubber tiling.

1715. **Cedarboard—A new product from Cedar waste.** *Research Memo, British Columbia Research Council, Vancouver* No. 52–3, [1952?] pp. 1. P.R.

A new interior wallboard has been obtained in B.C. Research Council Laboratories by a dry process without binder from Cedar [*Thuja plicata*?] waste of any description, also its sawdust, bark and rotten wood. Developments on a pilot-plant scale are necessary to assess the economics of commercial production.

1716. **Production of fibreboards from secondary colonial timbers.** *Rep. For. Prod. Res. Bd., Lond. 1951,* 1952 (47–8).

The first experiments on Wallaba [*Eperua* sp.] were made with old seasoned stock, but much better results, both in chipping and subsequent processing, were obtained from a green log, procured later, probably because long exposure to air renders the resin, which is very abundant in Wallaba, less reactive to chemicals. The methods and results in

chipping, cooking, beating, sheet formation, and pressing are discussed. The variables examined included the amount and nature of the cooking chemicals, the degree of beating, the pressing schedule and the effect of prior extraction of resin from the chips. Properties of the boards were satisfactory; they are rather darker and denser than commercial hardboards. Strength properties (modulus of rupture 6000–7000 lb.) are above those required by *Brit. Stand.* No. 1142. Water absorption is rather high but can probably be reduced, e.g. by incorporation of size. Experiments have been made in making hardboard from Wallaba from which resin has been extracted for the production of metallurgical coke and phenols [cf. *For. Abstr.* 10 (No. 2115)]. About 80% of the total resin in the wood can be removed by a single extraction of the chips with alcohol.

1717. Jessen, H. C. **Drying of insulating board.** *Tappi* 35 (10), 1952 (455–67). 5 refs. P.R.

A brief account of the early history of the drying of insulating board is followed by a description of the component parts of a modern roller drier adapted for the drying of insulating board. Discusses the theoretical aspect of the drying of insulating board in a roller drier, describing the migration of moisture and evaporation. *From author's summary.*

1718. Mottet, A. L. **Some observations on tests of moisture resistance of hard-pressed boards and their significance.** *J. For. Prod. Res. Soc.* 2 (1), 1952 (36–41). P.R.

Tables and graphs of dimensional stability of various pressed boards when exposed to relative humidities of 20–94%, and water resistance of these boards.

1719. Kitahara, K. **Studies on hardened fiberboard. III. The effect of moisture content on the Young's modulus and bending strength of hardened fiber-board. V. Effects of the wire-netting used in manufacture on the properties of hardened fiberboard.** *Wood Industry* [, *Japan*] 5, 1950 (172–4); 6, 1951 (161–4). From *abstr.* in *Rec. Res. Fac. Agric. Univ. Tokyo* No. 1, 1950/51 (1952), (75). [E.]

The board tested was made from sawdust of *Cryptomeria japonica* with milk casein. The relation between the moisture content u (expressed as a %), and Young's modulus E, is indicated by the following formula $E \quad (\times 10^4) = 4{\cdot}0 - 0{\cdot}07u$ (kg./sq. cm.) and that between u and modulus of rupture σ by $\sigma = 268\,(1 - 0{\cdot}020\,u)$ (kg./sq. cm.). To offset the decrease in mechanical strength in hardened board, moisture content must, therefore, be increased. Results of tests of properties (thickness, moisture content, specific gravity, Young's modulus, modulus of rupture, ratio of deflection to span, energy absorbed in impact bending, and hardness) are tabulated for the different meshes used in manufacture.

863. *Wood Hydrolysis. Saccharification*

See also Nos. 1608–9, 1723–4.

1720. Gilbert, N., Hobbs, I. A., and Levine, J. D. **Hydrolysis of wood, using dilute sulfuric acid.** *Industr. Engng. Chem.* 44 (7), 1952 (1712–20). 20 refs. P.R.

Describes the pilot plant built at Wilson Dam by the Tennessee Valley Authority, and the experimental work resulting in the modification of the Madison process to use somewhat simpler equipment and to produce solutions of higher concentration.

1721. Čalov, N. V., and Glazman, S. S. Batareĭnyĭ gidroliz gemicelljuloz berezovoĭ dreveslny pri atmosfernom davlenii. [**Battery hydrolysis of the hemicelluloses of Birch wood at atmospheric pressure.**] *Žurnal Prikladnoĭ Himii, Moskva* 21 (5), 1948 (496–501). 3 refs. [Russ.russ.] D.S.I.R.

Battery hydrolysis of Birch wood with moisture content of 20–30% by means of H_2SO_4 at 100° C. yields hydrolysates containing 9–13% of reducing substances: 16–18% pentosans (on the basis of oven-dry wood weight) are hydrolysed; the consumption of H_2SO_4 is 42–47 kg./100 kg. of reducing substances contained in the hydrolysate. The following schedule is recommended: concentration of H_2SO_4—3%; ratio of the amount of hydrolysate withdrawn from the front hydrolyser, to that of the sawdust—2; number of hydrolysers—4.

1722. Zaĭceva, A. F., and Nikitin, N. I. Vodnyĭ gidroliz drevesiny duba. [**The aqueous hydrolysis of Oak wood.**] *Žurnal Prikladnoĭ Himii, Moskva* 24 (4), 1951 (392–403). 22 refs. [Russ.] D.S.I.R.

It has been found that a prolonged second treatment of Oak wood with boiling water yields a large proportion of water-soluble substances. The proportion of solubilized sawdust was: 32·0% after 100 hours of boiling, 51·5% after 500, and 65·6% after 1000. The difference between heartwood and sapwood in this respect is very small. The chemical composition of the wood residue resembles the average composition of the dissolved substances. The individual constituents of wood, however, pass into solution at very different speeds during the soft aqueous hydrolysis—after 1000 hours, ca. 90% of all pentosans, 95% of uronic acids, 75% of lignin, and only 36% of cellulose. The wood carbohydrates pass into solution mainly in a polymerized form. The main sugar in the aqueous hydrolysates is xylose. Anatomical investigation shows that the prolonged aqueous extraction also leaches out the cell contents.

864. *Utilization of Lignin*

See also Nos. 1712, 1728.

1723. Nowak, A. Verfahren zur Gewinnung von reaktionsfähigem Lignin. [**Method of obtaining reactive lignin.**] *Austrian Patent* No. 167,647, Feb. 2, 1951. pp. 2. [G.] P.O.

The inert lignin obtained as a by-product of the saccharification of wood is activated by treating it at elevated temperature (up to 350° C.) and pressure (up to 50 atm.) with solvents such as butanol, acetone, ethylene chlorohydrin, cyclohexanol, cyclohexanone, phenol, or aniline. The lignin is thus partially depolymerized without formation of phenolic compounds. The treated lignin is more soluble than the untreated.

1724. Mendlina, N. G. Aktivirovanie gidroliznogo lignina obrabotkoĭ ego raznymi metodami. [**Activation of hydrolysis-waste lignin by different**

treatments.] *Žurnal Prikladnoĭ Himii, Moskva* 24 (6), 1951 (640–6). 7 refs. [Russ.russ.] D.S.I.R.

The lignin obtained as wood-hydrolysis waste is almost insoluble and, owing to its small content of OH groups, chemically inert. By sulphonating it with a 10% oleum, ca. 50% of soluble products were obtained, which developed tanning properties after treatment with $CaCO_3$. By treating the lignin with phenol, a water-insoluble condensation product was obtained which could be transformed by sulphonation into a completely soluble tanstuff, superior in quality to the sulphite-cellulose extract.

1725. McIntosh, W. A. **Alkali lignin to stabilize slow-break asphalt emulsions.** *Industr. Engng. Chem.* 44 (7), 1952 (1656–9). 2 refs. P.R.

Alkali lignin (Indulin) isolated from the waste liquors resulting from pulping Pine wood by the kraft or sulphate process, has been found to be a very effective stabilizer for slow-break asphalt emulsions. It is compatible with all types of asphalt encountered, and all common soap emulsifiers.

866. *Utilization of Wood Extractives*

See also Nos. 1611, 1716.

1726. Goldblatt, L. A., and Burgdahl, A. C. **Turpentine from Ponderosa Pine.** *Industr. Engng. Chem.* 44 (7), 1952 (1634–6). 9 refs. P.R.

Chemical analysis has revealed a similarity between steam-distilled turpentine obtained from the acetone extraction of *P. ponderosa* lumber and that obtained in the same manner from its stumps.

1727. Čadež, Z. Iskorištavanje pilanskih otpadaka u proizvodnji tanina. [**Utilization of sawmill waste in the manufacture of tannin.**] *Drvna Industrija, Zagreb* 2 (8), 1951 (1–9). [Croat.]

Discusses the use of Oak sawmill waste other than sawdust as a raw material for the tannin industry. Cut-offs are better than slabs or edgings, as they contain less sapwood and decayed wood, and no bark. The Oak waste used in Jugoslavia contains 3–6% of tannins, and up to 7·5% in stumpwood waste. Describes the sorting of waste according to species, kind of waste, size, and quality; its comminution and drying. In Croatian sawmills, 100 cu.m. Oak sawlogs yield up to 10 tons of assorted wood waste and 6 tons of pure sawdust. Since 1929, the three Croatian tannin plants have been using large quantities of wood waste, the proportion of waste to the total consumption of raw material rising sometimes to 40%. Chestnut and Spruce waste are also used in Jugoslavia, as well as galls and Sumach.

1728. Sohn, A. W., and Roser, E. Zur Frage: Fichten- oder Buchenablauge als Rohstoff für Ligningerbextrakte. [**Spruce or Beech waste liquors as raw material for lignin tanning extracts.**] *Leder, Darmstadt* 2 (9), 1951 (207–9). 5 refs. [G.g.] B.L.M.R.A.

In connexion with Sagoschen's paper [cf. *For. Abstr.* 13 (No. 1717)] the author suggests use of the Spruce lignin tanstuff 'Hansa D' instead of Beech lignin tanstuff, particularly because of its brighter pigmentation and more favourable non-tannin/tannin ratio.

867. *Destructive Distillation*

See also No. 1537.

1729. Shibamoto, T., and Kuriyama, A. **Studies on the carbonization of wood (1).** *Journal of the Japanese Forestry Society, Meguro, Tokyo* 32, 1950 (43–6). From *abstr.* in *Rec. Res. Fac. Agric. Univ. Tokyo* No. 1, 1950/51 (1952), (82–3). [E.]

Quercus serrata of different moisture contents (m.c.) was used in the experiments in an iron retort. Yields of charcoal, of acids (mainly acetic acid) in the distilled liquor, and of wood gas, increased, and yields of distilled liquor (including settled tar) decreased, with decreasing m.c. The concentration of acids in the distilled liquor increased with decreasing m.c. Charcoal density was highest for wood not air-dried after felling. During the destructive distillation water was removed at 100–150° C., the wood decomposed gradually at 150–250°, and with a rapid rise in temperature a large quantity of distilled liquor was run off and wood gas obtained at 250–350°. The wood gas contained about 60% CO_2 and 20–30% CO at 150–300°. [Cf. *For. Abstr.* 13 (Nos. 789–90).]

1730. Shibamoto, T., Kuriyama, A., and Higuchi M. **Studies on the carbonization of wood (2).** *Journal of the Japanese Forestry Society, Meguro, Tokyo* 32 ,1950 (47–50). From *abstr.* in *Rec. Res. Fac. Agric. Univ. Tokyo* No. 1, 1950/51 (1952), (79). [E.]

Quercus serrata of different moisture contents (m.c.) was used in these experiments in a 500-c.c. aluminium retort. Yields of the products of destructive distillation and the concentration of acetic acid were similar to those previously reported [cf. preceding abstract]. Charcoal density was highest for wood not air-dried after felling and decreased with decreasing m.c. This did not, however, apply to wood air-dried to a m.c. of less than 10%, soaked in water and then re-dried to various m.c. The course of destructive distillation could be divided into 4 stages: water was removed at temperatures of 150–200° C., small quantities of distilled liquor and wood gas were run off at 200–275°, large quantities at 275–300°, and smaller quantities of distilled liquor and large quantities of wood gas at 300–400°. The distilled liquor at 250–400° contained settled tar. The concentration of acetic acid was high in the distilled liquor at 200–275° and that of methanol at 275–350°; it is assumed that most of the cellulose was decomposed in the former and lignin in the latter temperature range.

1731. Shibamoto, T., Kuriyama, A., and Sato, O. **Studies on the carbonization of wood (3).** *Journal of the Japanese Forestry Society, Meguro, Tokyo* 32, 1950 (75–83). From *abstr.* in *Rec. Res. Fac. Agric. Univ. Tokyo* No. 1, 1950/51 (1952), (82). [E.]

A study was made on charcoal from *Quercus* and other species, either freshly felled or air-dried for 1–10 months and with different moisture contents (m.c.), using country charcoal kilns. The yield of charcoal by weight % of the wood at existing m.c. increased with decreasing m.c., but m.c. had little or no effect on yield % based on absolutely dry wood. The volume of charcoal per unit volume of

wood increased gradually as m.c. decreased. The density and hardness of the charcoal decreased gradually as the m.c. of the wood decreased, optimum m.c. being 30–35%.

1732. Shibamoto, T., Minami, K., and Sakai, H. **Studies on the carbonization of wood (4, 5 and 6).** *Journal of the Japanese Forestry Society, Meguro, Tokyo* 32, 1950 (372–7; 400–2); 33, 1951 (12–7). From *abstr.* in *Rec. Res. Fac. Agric. Univ. Tokyo* No. 1, 1950/51 (1952), (81–2). [E.]

(4) Parallel experiments were carried out with green and seasoned wood in a dry-distillation plant on a semi-industrial scale. For seasoned wood, shortening the distillation period gave a higher yield of valuable products and concentration of pyroligneous acid. For green wood, a long drying period gave slightly increased yields of charcoal, tar and acetic acid, and remarkably increased hardness of charcoal. (5) Four methods of heating were compared: (*a*) roasting as usual in a retort; (*b*) roasting and simultaneous direct heating with hot gas generated by a charcoal gas producer; (*c*) direct heating with the hot gas from the charcoal gas producer; and (*d*) roasting and simultaneous direct heating with the hot exhausted gas. Of these (*d*) gave the best results; air convection within the retort was promoted, moisture was rapidly carried off and no special fuel was needed. (6) In serial distillation, wood with a low m.c. gave rather higher yields of acetic acid, tar and charcoal, than wood of high m.c., but the latter gave a larger yield of fixed carbon. At the first distillation the wood with a high m.c. required more fuel and a longer distillation period but at a later distillation there was no difference between wood of low and high initial m.c. The amount of fuel needed was reduced to 60% and the distilling period shortened by an hour in succeeding distillations as compared with the first. Passing hot exhausted gas through the retort reduced the fuel and distillation period especially in the first distillation.

1733. Leivands, A. Procédé de transformation du bois en charbon analogue au charbon de terre. **[Method of transforming wood into coal analogous to pit-coal.]** *French Patent* No. 993,486, Oct. 31, 1951. pp. 2. [F.] P.O.

Wood is comminuted, dried at 275–280° C., impregnated with dehydrated tar, and distilled in a closed vessel.

1734. **[Charcoal burning in pits.]** *Rapp. Inst. nat. Étude agron. Congo belge 1951*, 1952 (46). [F.]

The wood of *Marquesia macroura*, reputedly unsuitable for charcoal, yielded more than 100 kg. of excellent charcoal per cu.m. of billets 15–21 cm. in girth. The wood of *Brachystegia hockii* yielded 165 kg./cu.m.

1735. Jenkins, C. E. **Apparatus for gasification of wood.** *U.S. Patent* No. 2,556,090, June 5, 1951. pp. 4 + 5 dgms. P.O.

A producer which is said not to become fouled or clogged with condensates and distillates.

1736. Ščetinin, I. P. Prisposoblenie dlja raboty gazogeneratorov na syryh čurkah. **[A device for adapting gas-producers to [burn] moist wood blocks.]** *Lesn. Prom.* 11 (3), 1951 (7–8). [Russ.]

Illustrated description of a device for ejecting the water-vapour/gas mixture from the top part of the hopper, thus enabling fuel of high moisture content to be gasified in the gas-producers of the ZIS-21 lorries and KT-12 tractors. [Cf. *For. Abstr.* 11 (Nos. 2862–3).]

1737. Petrov, Ja. P. Sudovaja švyrkovaja gazogeneratornaja ustanovka. **[Rivercraft gas-producing plant working with firewood.]** *Lesn. Prom.* 11 (3), 1951 (10–2). [Russ.]

An illustrated description of the S-7 plant using firewood of 500 mm. length and 45% relative moisture content. Its gas-producer was tested in conjunction with the internal combustion engine 3D6-GD, both in the laboratory and on a boat. Results are given.

1738. Roux, B. Agglomérés de charbon de bois. **[Charcoal briquettes.]** *French Patent* No. 973,231, Feb. 8, 1951. pp. 2. [F.] P.O.

Gelatine emulsion in formol solution, with or without other binders such as tar, pitch, dextrin or an inorganic substance, is added to the pulverized charcoal. The briquettes are produced at a pressure of 100–500 atm. and dried at 100–120° C. Their sp. gr. is 0·75–0·85.

89. OTHER ('MINOR') FOREST PRODUCTS

892. *Vegetable Products*

See also No. 1696.

892.1. Grass. Litter. Leaf fodder

1739. Nehring, K., and Schütte, J. Über die Zusammensetzung und den Futterwert von Laub und Reisig. I. Mitteilung: Über die Änderungen in der Zusammensetzung von Laub und Reisig verschiedener Baumarten in Abhängigkeit von der Vegetationszeit. **[Composition and fodder value of foliage and twigs. I. Changes in the composition of foliage and twigs of different tree species during the period of growth.]** *Archiv für Tierernährung, Berlin* 1 (3), 1950 (151–76). 16 refs. [G.g.] L.S.

Results of 2 years' tests are given. The effect of growth is more perceptible in foliage than in twigs. The crude protein content of foliage falls, as a rule, from spring to autumn, and so does the protein digestibility; the amount of fibrous material increases slightly during the same period. Protein digestibility varies between 80% (*Sambucus nigra* leaves) and 40% (Beech and Birch leaves). In twigs it is usually very low, *Sambucus nigra* with 60% being an exception. Foliage is characterized by a favourable Ca and P content, while the P content of twigs is low. Interspecific differences in mineral content, particularly K, are very great. For large-scale feeding, leafy twigs are recommended, the best time for collection being generally from late June until mid-August, but somewhat earlier for Beech and Birch. Their value, in terms of chemical composition and protein digestibility, is in the following descending order: (1) *Sambucus nigra*; (2) *Tilia platyphyllos, Fraxinus excelsior, Populus* sp.;

(3) *Acer pseudoplatanus, Ulmus campestris, Quercus robur, Sorbus aucuparia*; (4) *Carpinus betulus, Alnus glutinosa*; (5) *Fagus sylvatica, Betula verrucosa.*

1740. Nehring, K., and Schramm, W. Über die Zusammensetzung und den Futterwert von Laub und Reisig. II. Mitteilung: Über die Verdaulichkeit von Laub und Sommerreisig. **[Composition and fodder value of foliage and twigs. II. Digestibility of foliage and summer twigs.]** *Archiv für Tierernährung, Berlin* 1 (5), 1951 (264–89). 6 refs. [G.g.] L.S.

Presents tabulated results of laboratory and feeding tests of digestibility, particularly of twigs of broadleaved species in green, ensilaged, and dried condition. The ensilage of finely cut twigs presents no difficulties, and the ensilaged fodder was readily eaten by the animals. Foliage and twigs cut early were accepted without great difficulty, but considerable differences appeared between species for older leaves or twigs. The highest digestibility was found for leafy twigs of Maple, Lime, and Poplar, the value being roughly the same as for hay of average quality. Feeding tests agreed well with laboratory tests.

1741. Nehring, K., and Schramm, W. Über die Zusammensetzung und den Futterwert von Laub und Reisig. III. Mitteilung: Über den Futterwert von Fallaub und Winterreisig. **[Composition and fodder value of foliage and twigs. III. Fodder value of shed foliage and winter twigs.]** *Archiv für Tierernährung, Berlin* 1 (6), 1951 (342–60). 8 refs. [G.g.] L.S.

Compared with green leaves, the shed leaves have a lower protein and a higher fibre content; the digestibility of the protein is very small. On the other hand, the fodder value of winter twigs is higher than that of summer twigs, the best species being *Sambucus nigra, Robinia pseudoacacia* and *Fraxinus*, and the worst, Birch and Oak. The digestibility of the total organic substance varied widely with species, while that of the protein was as a rule high. The fodder value of the more digestible winter twigs (Poplar, Beech) corresponds to that of winter straw.

892.4. Bark Products. Tanstuffs. Cork

See also Nos. 1223, 1607–11.

1742. Herfeld, H., and Zieger, E. Fichten-, Kiefern- und Erlenzapfen als Gerbmaterialien. **[Spruce, Pine, and Alder cones as tanning materials.]** *Gesammelte Abhandlungen des Deutschen Lederinstituts, Freiberg/Sa.* No. 6, 1951 (65–75). 8 refs. [G.] B.L.M.R.A.

Results of an investigation into the tannin content of Spruce cones, both fallen and gathered from the tree; various portions of Spruce cones and Pine and Alder cones; with tables on results of extraction of Spruce and Alder cones, and of compatibility tests of Spruce-cone extracts with vegetable and synthetic tanstuffs. In this respect Pine cones were found to be of little value, but cones of Spruce and Alder (*Alnus glutinosa, A. incana, A. rubra*) could be advantageously used in the tanning industry.

1743. Rao, P. R., and Puntambekar, S. V. **A note on the Karada bark tannins.** *Indian For.* 78 (11), 1952 (582–3). 6 refs.

Air-dry bark of *Cleistanthus collinus* was found to contain 30–32% of water extractives, of which 65% were tannins, the remainder being soluble non-tannins. Of these tannins, 75% were found to be phlobatannins.

1744. Rao, P. H. **A note on Wattles.** *Sci. & Cult.* 18 (2), 1952 (92–4). 2 refs. E.M.B.

Figures for tannin content and the ratio of tannins to non-tannins in bark of *Acacia* spp. from Australia, S. Africa and India are tabulated.

1745. Raymond, W. D. **The use of Acacia pods and bark as tanning materials.** *Colon. Plant Anim. Prod.* 2 (4), 1951 (285–91).

Gives figures showing the tannin content of *A. arabica* and *A. nilotica* pods and bark from Africa and India.

1746. Shibamoto, T., Minami, K., and Kubota, S. **Content of tannin in the bark of *Acacia mollissima* in Chiba prefecture.** *Journal of the Japanese Forestry Society, Meguro, Tokyo* 32, 1950 (295–6). From *abstr.* in *Rec. Res. Fac. Agric. Univ. Tokyo* No. 1, 1950/51 (1952), (83). [E.]

Tannin contents of 22 and 29% were obtained, much the same as in samples from Formosa and Wakayama prefectures, but lower than those obtained in its native habitat.

1747. **Tannin from waste bark.** *Bull. Ntheast. Wood Utiliz. Coun.* No. 39, 1952. pp. 31. 11 refs. Price $2·50.

Comprises the following papers: The tannin material situation (*W. E. Hillis*); The tannin industry in New England (*K. E. Bell*); Operation of a tannin extraction plant (*E. S. Flinn*); Potential tannin supplies from domestic barks (with summary and 11 refs.) (*J. S. Rogers*); together with brief notes on methods of bark separation, including air flotation, thermo-pressure and cyclone methods, and on portable barkers.

1748. MacLean, H., and Gardner, J. A. F. **Bark extracts in adhesives.** *Pulp Paper Mag. Can.* 53 (9), 1952 (111–4). 8 refs.

Tabulated results are presented of initial tests on the usefulness of tannin extracts, prepared by simple hot-water extraction of the bark of Western Hemlock floated in sea water. They show that Western Hemlock tannin reacts rapidly with formaldehyde and that it is compatible with phenol-formaldehyde resins. The tannin extract was substituted for up to 75% of the phenol-formaldehyde resin in a weatherproof plywood adhesive without impairing its strength and durability. *From authors' abstract.*

1749. Oranskiĭ, N. I. K himičeskomu sostavu probki amurskogo barhata. **[Chemical composition of the cork of Amur Cork Tree [*Phellodendron amurense*].]** *Žurnal Prikladnoĭ Himii, Moskva* 23, 1950 (1345–9). 5 refs. [Russ.] D.S.I.R.

1750. Dugelay, A. La production et l'industrie du liège en France. **[Cork production and the cork**

industry in France.] *Rev. for. franç.* 1952 (10), (728–51). [F.]

Gives an account of area of Cork forest, management, production, and manufacture.

1751. **[Experimental retting of *Brachystegia* bark.]** *Rapp. Inst. nat. Étude agron. Congo belge 1951*, 1952 (46). [F.]

The fibres were easily cleaned but became much entangled, entailing considerable loss in combing.

1752. THOMPSON, C. L. (to The Pacific Lumber Company). **Well drilling composition.** *Canadian Patent* No. 481,545, March 4, 1952. pp. 3. P.O.

An aqueous drilling mud consisting mainly of water-insoluble clayey material with an addition of the reaction product between alkali metal hydroxide and Redwood bark dust which is claimed to reduce the viscosity, gel strength and water loss of the mud.

892.5. Medicinal Plants, Edible Plants, Insecticides from Plants etc.

See also No. 1489.

1753. HAMMARLUND, E. R., PENNINGTON, D. E., and RISING, L. W. **An antibacterial substance from the leaves of *Arbutus menziesii*.** *J. Amer. pharm. Ass. (sci. Ed.)* 41 (10), 1952 (561–5). 3 refs. O.R.S.

1754. HARTWELL, J. L., JOHNSON, J. M., FITZGERALD, D. B., and BELKIN, M. **Silicicolin, a new compound isolated from *Juniperus silicicola*.** *J. Amer. chem. Soc.* 74 (17), 1952 (4470). O.R.S.

The discovery that an aqueous solution of the pulverized dried needles of *J. silicicola* damaged sarcoma 37 in mice prompted a search for the active agent. After a process involving successive extractions with different organic solvents and chromatography with activated alumina, a pure crystalline compound, highly active against the tumour, for which the name silicicolin is proposed, was obtained in 0·11% yield. Its properties are described. The evidence is consistent with the assumption that it is a lignan, possibly the previously unknown desoxypodophyllotoxin.

1755. ORMANCEY-POTIER, A., BUZAS, A., and LEDERER, E. Sur le calophyllolide et l'acide calophyllique isolés des graines de *Calophyllum inophyllum*. **[Calophyllolide [$C_{25}H_{22}O_5$] and calophyllic acid [$C_{25}H_{24}O_6$] isolated from seeds of *C. inophyllum*.]** *Bull. Soc. chim. Fr.* 18 (7/8), 1951 (577–80). 5 refs. [F.f.] [Institut de Recherche sur le Cancer, Villejuif.] O.R.S.

1756. MÜLLER, J. M., SCHLITTLER, E., and BEIN, H. J. Reserpin, der sedative Wirkstoff aus *Rauwolfia serpentina* Benth. **[Reserpin, the sedative principle from *R. serpentina*.]** *Experientia, Basle* 8 (9), 1952 (338). 6 refs. [G.e.] O.R.S.

1757. BOSE, S. **Rauwolfinine, the new alkaloid of the root of *Rauwolfia serpentina*, Benth.** *Sci. & Cult.* 18 (2), 1952 (98). 3 refs. [University College of Science, Calcutta.] E.M.B.

The properties of rauwolfinine [cf. *For. Abstr.* 14 (No. 867)] are discussed.

1758. RAYMOND-HAMET. Sur l'alcaloïde principal d'une Rubiacée des régions tropicales de l'Amérique du Sud: l'*Ourouparia guianensis* Aublet. **[The chief alkaloid of *O. guianensis*, one of the Rubiaceae of tropical South America.]** *C.R. Acad. Sci., Paris* 235 (10), 1952 (547–50). 3 refs. [F.] O.R.S.

1759. TIHON, L. *Pausinystalia macroceras* (K. Schum) Pierre. Synonyme: *Corynanthe macroceras* (K. Schum). **[*P. macroceras*, synonym *C. macroceras*.]** *Bull. agric. Congo belge* 43 (3), 1952 (797–808). [F.flem.]

Analysis of the bark showed the presence of tannin (too little to be of practical value), yohimbine, and a crystallizable and a non-crystallizable alkaloid.

1760. MARTIN, W. F., BENTLEY, H. R., HENRY, J. A., and SPRING, F. S. **The isolation of novacine, an alkaloid from *Strychnos nux-vomica*, L., and its identification as *N*-methyl-*sec.*-*pseudo*brucine.** *J. chem. Soc.* Sept., 1952 (3603–4). O.R.S.

1761. CHATTERJEE, A. **Studies on the constitution of the active principles isolated from the immature bark of *Aegle marmelos*, Corrêa.** *Abstr.* in *Proc. 38th Indian Sci. Congr.* Part III, 1951 (84). C.G.B.

1762. ANET, F. A. L., GILHAM, P. T., GOW, P., HUGHES, G. K., and RITCHIE, E. **The chemical constituents of Australian *Flindersia* species. III. The alkaloids of *Flindersia collina* Bail.** *Aust. J. sci. Res.* 5*A* (2), 1952 (412–9). 11 refs. P.R.

1763. CANNON, J. R., HUGHES, G. K., PRICE, J. R., and RITCHIE, E. **The chemical constituents of Australian *Flindersia* species. IV. The constituents of *Flindersia bourjotiana* F. Muell.** *Aust. J. sci. Res.* 5*A* (2), 1952 (420–2). 2 refs. P.R.

1764. HUGHES, G. K., NEILL, K. G., and RITCHIE, E. **Alkaloids of the Australian Rutaceae: *Evodia xanthoxyloides* F. Muell. II. Isolation of the alkaloids from the leaves.** *Aust. J. sci. Res.* 5*A* (2), 1952 (401–5). P.R.

1765. CANNON, J. R., HUGHES, G. K., NEILL, K. G., and RITCHIE, E. **Alkaloids of the Australian Rutaceae: *Evodia xanthoxyloides* F. Muell. III. The structures of the coloured alkaloids, evoxanthidine, xanthevodine, and xanthoxoline.** *Aust. J. sci. Res.* 5*A* (2), 1952 (406–11). 6 refs. P.R.

1766. MCKENZIE, A. W., and PRICE, J. R. **Alkaloids of the Australian Rutaceae: *Glycosmis pentaphylla* (Retz.) Correa.** *Aust. J. sci. Res.* 5*A* (3), 1952 (579–80). 2 refs. P.R.

1767. HAYNES, H. F., NELSON, E. R., and PRICE, J. R. **Alkaloids of the Australian Rutaceae: *Pentaceras australis* Hook. f. I. Isolation of the alkaloids and identification of canthin-6-one.** *Aust. J. sci. Res.* 5*A* (2), 1952 (387–400). 10 refs. P.R.

1768. NELSON, E. R., and PRICE, J. R. **Alkaloids of the Australian Rutaceae: *Pentaceras australis* Hook. f. II. Identification of 5-methoxycanthinone.** *Aust. J. sci. Res.* 5*A* (3), 1952 (563–9). 5 refs P.R.

892.6. Resin and Turpentine. Essential Oils. Fixed Oils and Fats. Gums. Latex. Dyestuffs. Sap Sugar

See also Nos. 1128, 1226–7, 1489, 1638–9.

1769. Brus, G., and Legendre, P. Nouveau mode de traitement des gemmes de conifères. [**A new method of treatment for coniferous resin.**] *French Patent* No. 990,892, Sept. 27, 1951. pp. 5. [F.] P.O.

Oleoresin is dissolved in an appropriate solvent to separate it from H_2O, solid impurities and oxy acids. These acids are then recovered as oxidized resin.

1770. Bardyšev, I. I. Sostav skipidara daurskoĭ listvennicy. [**Composition of the turpentine of *Larix dahurica*.**] *Žurnal Prikladnoĭ Himii, Moskva* 23 (8), 1950 (882–5). 10 refs. [Russ.] D.S.I.R.

This turpentine contains mainly *l*-α-pinene, *l*-β-pinene, a mixture of *d*-Δ^3-carene with *d*-terpene, and a small proportion of other hydrocarbons.

1771. Bardyšev, I., Pirjatinskiĭ, A., Bardyševa, K., and Černjaeva, O. O prisutstvii Δ^3-karena v skipidare obyknovennoĭ eli (*Picea excelsa* Lk.). [**Presence of Δ^3-carene in the turpentine of *P. abies*.**] *Žurnal Prikladnoĭ Himii, Moskva* 23 (8), 1950 (847–52). 3 refs. [Russ.] D.S.I.R.

Δ^3-carene was detected for the first time in Spruce turpentine, along with α-pinene, β-pinene, and the dipentene-limonene mixture.

1772. Pejoski, B. Jugoslovenski balsami. [**Jugoslavian balsams.**] *Šumarstvo* 2 (4), 1949 (33–7) [Croat.]

A brief account of some properties and uses of the resins of: *Pinus heldreichii*, *P. peuce*, *P. halepensis*, and *P. nigra*.

1773. Varićak, T., and Pejoski, B. Smole naših borova u upotrebi kod mikroskopske tehnike i optike. [**The use of Jugoslavian Pine resins in microscopy and optics.**] *Šumarstvo* 3 (1), 1950 (23–8). 4 refs. [Croat.croat.]

The resin of *Pinus peuce* is claimed to be a very good substitute for Canada balsam and Cedar oil. Resins of *P. halepensis*, *P. nigra*, and *P. heldreichii* can also be used for the same purposes, although they are inferior (in the sequence indicated) to that of *P. peuce*. [Cf. *For. Abstr.* 12 (Nos. 650, 651, 3293).]

1774. Naffa, P. Les constituants sesquiterpéniques de l'essence de térébenthine de pin maritime (2e communication). [**The sesquiterpene constituents of turpentine from Maritime Pine. 2.**] *Bull. Soc. chim. Fr.* 18 (9/10), 1951 (753–5). 3 refs. [F.f.] O.R.S.

Cf. *For. Abstr.* 11 (No. 2177).

1775. Laurent, P. A. Sur la constitution de l'huile de May Nhang. [**The constitution of the oil from *Dipterocarpus alatus*.**] *Bull. Soc. chim. Fr.* 19 (5/6), 1952 (615–7). [F.f.] O.R.S.

An analysis of the damar obtained by tapping *D. alatus*.

1776. Guenther, E. **Recent developments in essential oil production.** *Econ. Bot.* 6 (4), 1952 (355–78).

Discusses supplies and markets of 29 essential oils.

1777. Cochrane, J. A. **[Western Red] Cedar leaf oil extraction.** *J. For. Prod. Res. Soc.* 1 (1), 1951 (120–3). P.R.

Describes a pilot still constructed for studying the relationship between the yield of oil and various factors. Age of tree and cutting or crushing of leaves were immaterial; storing the leaves lowered the yield considerably; trees growing on dry, open ridges give higher yields than trees near water; effect of season was indeterminate. The commercial possibilities are reviewed.

1778. Torner Ochoa, J. Aceites esenciales españoles—características de algunos aceites de diversas procedencias forestales. [**Essential oils of Spain—characteristics of some oils from various forest sources.**] [*Bol.*] *Inst. for. Invest. Exp. Madrid* 23 (61), 1952. pp. 107 + 2 plates. 12 refs. [Span.span.f.e.g.]

Presents data on physical and chemical properties and yield of oil from *Lavandula spica*, *L. pedunculata*, *Thymus mastichina*, *Rosmarinus officinalis*, *Cistus ladaniferus*, *Myrtus communis* and *Helichrysum stoechas*.

1779. Naves, Y.-R. Études sur les matières végétales volatiles CXVIII (1). Sur l'huile essentielle du Louro Inhamuy (*Nectandra elaiophora* Barb. Rodr.) de l'Amazonie Brésilienne. [**Studies on volatile vegetable substances. CXVIII (1). The essential oil of *N. elaiophora* of Brazilian Amazonia.**] *Bull. Soc. chim. Fr.* 18 (11/12), 1951 (987–91). 63 refs. [F.f.] O.R.S.

1780. Bayfield, R. **Chemicals from the leaves of forest flora. Part I. Eucalypts.** *Tech. Notes For. Comm.* (*Div. Wood Technol.*) *N.S.W.* 5 (4), 1951 (16–9).

Discusses the presence in different species, and the structure, properties and uses, of phellandrene, piperitol and piperitone (a raw material for the manufacture of menthone, menthol and thymol, which are also described).

1781. Xabregas, J., and Texeira, J. Brito. Flora económica de Angola. I. Oleaginosas. [**Economic flora of Angola. I. Oil-producing plants.**] *Agron. angol.* No. 6, 1952 (103–14 + 3 plates). 10 refs. [Port.f.e.]

Notes on *Moringa pterygosperma*, *Ricinodendron rautanenii* and *Entandrophragma ekebergioides*, their botanical characteristics, distribution in Angola, and extraction and properties of the oils.

1782. Anderson, E., and Harris, L. **The composition of Silk[y] Oak [*Grevillea robusta*] gum.** *J. Amer. pharm. Ass.* (*sci. Ed.*) 41 (10), 1952 (529–31). 11 refs. O.R.S.

1783. Ingle, T. R., and Bhide, B. V. **Chemical examination of Gum Mokha (N. O. *Schrebera swietenioides*).** *Abstr.* in *Proc. 38th Indian Sci. Congr.* Part III, 1951 (77). C.G.B.

1784. White, E. V. **Occurrence of the L-arabinose unit in Sapote gum [probably from *Achras sapota*].** *J. Amer. chem. Soc.* 74 (15), 1952 (3966). 4 refs. O.R.S.

1785. Hillis, W. E., and Ho, G. **Sub-project C.7–6. Kino-like material in Eucalypts. Progress report No. 4. The isolation of the cellular kino of Jarrah (*Eucalyptus marginata* Sm.).** Division of Forest Products, C.S.I.R.O., South Melbourne. 1952. pp. 8 + 5 tbls. 16 refs. P.R.

1786. Hillis, W. E. **The chemistry of Eucalypt kinos. II. Aromadendrin, kaempferol, and ellagic acid.** *Aust. J. sci. Res.* 5*A* (2), 1952 (379–86). 25 refs. P.R.

Aromadendrin has been isolated in ca. 5% yield from the kino of *Eucalyptus calophylla* and in 1·1–1·3% yield from the kino of *E. corymbosa*. It has been identified as 3,4′,5,7-tetrahydroxyflavanone. Kaempferol was isolated from *E. calophylla* kino and ellagic acid from both kinos. *Author's summary*. [Cf. *For. Abstr.* 13 (No. 3501).]

892.7. Fruits, Seeds. Fibres, Yarns and Flosses

See Nos. 1224–5, 1552, 1742, 1745, 1755.

893. *Animal Products*

See Nos. 1229–30.

9. FORESTS AND FORESTRY FROM THE NATIONAL POINT OF VIEW. SOCIAL ECONOMICS OF FORESTRY

90. GENERAL

1787. Orman Davamızın Çeşitli Yönlerine Dair Ilmî Görüşler. **[Scientific opinions on various aspects of our forest problem.]** Türkiye Ormancılar Cemiyeti, Ankara, 1951. pp. 79. [Turk.] X.

A symposium of short articles by 13 authors, professors and staff of the Forest Faculty at Istanbul University. These include: nationalization and the departmental running of forests, and the main lines of Turkish forest policy; soil conservation; the conflict between agriculture and the forest and the need for population resettlement; yield of forests (author's estimate for Turkey is 0·29 cu.m./ha./p.a.); forests and grazing; wood industry and tended forest.

1788. FOGGIE, A.; KINLOCH, D.; TAYLOR, C. J. **The development and problems of forest management and the progress of silvicultural research in the closed forest zone of the Gold Coast.** Government Printing Department, Accra. 1952. pp. 25. (6th British Commonwealth Forestry Conference, Canada, 1952.)

In Part I of this composite paper, a summary is given of existing legislation, systems of land tenure, and the problems of forest finance. The forest itself is described. In Part II the development of forest management in the Gold Coast during the past 25 years is reviewed. Part III contains an outline of the silvicultural systems applicable to tropical rain forest. In Part IV the progress of silvicultural research, with particular reference to the conversion of the indigenous forest to the tropical shelterwood system is described. The methods of research and assessment of results are dealt with in some detail. *From authors' summary.*

1789. BOTTENBURG, M. VAN. **The forest situation in Colombia.** *Unasylva* 6 (2), 1952 (65–70).

1790. RANGHEL GALINDO, A. **The forests of Colombia and some of their industrial possibilities.** *Proc. UNSCCUR, Lake Success, 1949* 5, 1951 (120–8).

902. *History of Forests and Forestry*

See also Nos. 1187, 1826.

1791. OLBERG, A. Hundert Jahre Vorratsentwicklung und Nutzung im Hochschulforstamt Chorin (1842–1941). **[A hundred years in growing-stock development and fellings in the Chorin instructional forest [of the Eberswalde School of Forestry] (1842–1941).]** *Allg. Forst- u. Jagdztg.* 123 (1), 1951 (20–6). [G.]

A historical management study of the development of the growing stock as regards amount and structure, prescribed and actual fellings, thinnings, and m.a.i.

1792. KÜNANZ, H. Zur Geschichte des Anbaus der Kiefer—*Pinus silvestris*—im oberhessischen Laubholzgebiet. **[The history of Scots Pine planting in the deciduous forest region of Upper Hesse.]** *Allg. Forst- u. Jagdztg.* 123 (3), 1952 (61–9). 12 refs. [G.]

903. *Forest Policy, General*

1793. GUILLEBAUD, W. H. **The rôle of state, communities, and private enterprise in the national forest policy of Great Britain.** Forestry Commission, London. 1952. pp. 6. (6th British Commonwealth Forestry Conference, Canada, 1952.)

1794. EATON, J. **The rôle of the state, communities and private enterprise in national forest policy.** Ministry of Agriculture for Northern Ireland. 1952. pp. 12. (6th British Commonwealth Forestry Conference, Canada, 1952.)

With particular reference to conditions in Northern Ireland.

1795. GONZÁLEZ VÁZQUEZ, E. La conservación de los montes españoles ante su actual estado regresivo y la situación europea en productos maderables. **[Conservation of the Spanish forests in relation to their present degenerated state and the European forest products situation.]** II Congreso Nacional de Ingeniería, Instituto de Ingenieros Civiles de España, Madrid 1950, Vol. IV, 1951 (109–15). [Span.]

Discusses world timber supplies and particular Spanish problems relating to forest conservation and regeneration. Among the author's recommendations for the improvement of the Spanish forests are: adoption of silvicultural systems ensuring natural regeneration; clearance of underbrush from the forest floor; planting mixtures (both coniferous and broadleaved species); regeneration of existing stands rather than afforestation of non-forest land; acquisition of forest land rather than bare land, for afforestation by the State; some control of exploitation; conversion of coppice and coppice with standards to high forest.

1796. CHATURVEDI, M. D., and RANGANATHAN, C. R. **The national forest policy of India.** Forest Research Institute, Dehra Dun. 1952. pp. 9. (6th British Commonwealth Forestry Conference, Canada, 1952.)

1797. **Report of the Forest Policy Committee, Madhya Pradesh.** Government Printing, Nagpur. 1951. pp. 114 + xl + 3 maps.

The 46 recommendations cover the major aspects of policy and management in what were formerly the Central Provinces and Berar.

1798. KHAN, M. H. **Forest policy: rôle of state, community and private enterprise in national forest policy.** [Government of Pakistan Press, Karachi.] 1952. pp. 8. (6th British Commonwealth Forestry Conference, Canada, 1952.)

With particular reference to conditions in Pakistan.

1799. PARRY, M. S. **Priorities in silviculture in Tanganyika.** Government Printer, Dar es Salaam. 1952. pp. 8. (6th British Commonwealth Forestry Conference, Canada, 1952.)

1800. PRINCE, G. H. **The rôle of states, communities and private enterprise in national forest policy.** Minister of Lands and Mines, New Brunswick. 1952. pp. 14. (6th British Commonwealth Forestry Conference, Canada, 1952.)

With particular reference to conditions in New Brunswick.

1801. MARCH, E. W. **Rôle of state, communities, and private enterprise in national forest policy with a review of the situation in Jamaica.** [Forest Department, Kingston, Jamaica.] 1952. pp. 8. (6th British Commonwealth Forestry Conference, Canada, 1952.)

1802. MARSH, R. E. **Essential features of forest policy and law [in the U.S.A.].** *Proc. UNSCCUR, Lake Success, 1949* 5, 1951 (184–7). 14 refs.

1803. CRUZ, E. DE LA. **Essential features of forest policy and forest law [in the Philippines.]** *Proc. UNSCCUR, Lake Success, 1949* 5, 1951 (181–3). 9 refs.

1804. BEDNALL, B. H. **Rôle of state, communities and private enterprise in national forest policy (Australia).** Government Printer, Adelaide. 1952. pp. 8. (6th British Commonwealth Forestry Conference, Canada, 1952.)

904. *General Regional Accounts of Forests and Forestry*

See also No. 1479.

1805. **Empire Forestry Conference.** *Timb. Tr. J.* 20 (3962), 1952 (1115–20).

Includes summaries of papers on forestry, forest resources, growth and drain and exports and imports in Canada, Great Britain, Australia, Gold Coast, Malaya, British Guiana, British Honduras, S. Africa, N. Borneo, Uganda, Queensland and S. Australia.

1806. **Britain's forests: Thornthwaite.** Forestry Commission, London. 1952. pp. 19. Price 1*s*.

1807. Estudio forestal y maderero de la provincia de Cuenca. **[The forests and forest products of Cuenca province.]** Servicio de la Madera, Ministerios de Agricultura y de Industria y Comercio, Madrid. 1951. pp. 106 + 2 maps + 1 gph. [Span.]

One of a series of reports to be put out by the Servicio de la Madera, which, among other duties, acts in an advisory capacity to the Ministries of Industry and Commerce and of Agriculture. The publication presents data on the extent and nature of the forests, ownership, timber production, sawmilling and woodworking industries.

1808. **Forestry in the Middle East.** *Unasylva* 6 (3), 1952 (104–23).

Describes forests and forestry in Afghanistan, Cyprus, Iran, Iraq, Jordan, Lebanon, Syria, Turkey, and West Pakistan.

1809. CHATURVEDI, M. D. **Report on the forests of the Andamans.** Government of India Press, New Delhi. 1952. pp. 30 + 8 photos + 1 map.

1810. ADAM, J. G. Les possibilités de la région forestière de la Haute-Guinée française. **[The potentiality of the forest zone in French Upper Guinea.]** *Bois For. Trop.* No. 24, 1952 (229–32). [F.e.span.]

1811. **Forests and forestry in New Brunswick: special report to the British Commonwealth Forestry Conference, Ottawa, Canada, 1952.** Minister of Lands and Mines, Fredericton, N.B. 1952. pp. 4.

1812. MARSHALL, C. **Report on forestry in the trust territory of the Pacific Islands.** *Scientific Investigations in Micronesia Report* No. 14, 1951. pp. 94 + 1 tbl. + 1 map. 28 refs.

905. *Forest Statistics and Resources*

See also Nos. 1805, 1810–1.

1813. **Digest of Sixth British Commonwealth Forestry Conference Statistics.** Forestry Branch, Department of Resources and Development, Canada. 1952. pp. 19.

This digest of statistics contained in the statements prepared by the forest authorities in the different countries participating in the Conference, gives in a series of tables the following information: forest area and population in 1950; progress in survey of forest resources; volume of standing timber in exploitable forest in 1950; output of home-grown wood, 1950; wood and wood products, imports and exports, 1950; value of gross annual imports from different sources, 1950; minor forest products, 1950; value of imports of minor forest products, 1950; value of exports of minor forest products, 1950. The statistics deal with the following countries. *Africa:* Bechuanaland Protectorate, Gold Coast, Kenya Colony, Mauritius, Nigeria, Northern Rhodesia, Nyasaland Protectorate, Sierra Leone, Southern Rhodesia, Sudan, Swaziland, Tanganyika, Uganda Protectorate, Union of South Africa. *America (North):* Canada. *America (Central and South):* British Guiana, British Honduras, Dominica, Grenada, Jamaica, St. Vincent, Trinidad and Tobago. *Europe:* Great Britain, Northern Ireland. *Indian Ocean Area:* Ceylon, India, Malaya, Pakistan. *Mediterranean Area:* Cyprus. *Pacific Area:* Australia, Colony of Fiji, New Zealand, Colony of North Borneo, Colony of Sarawak.

1814. **Forest and forest products statistics—Canada.** *Bull. For. Br. Can.* No. 106, 1952. pp. 65.

A re-presentation of all the data previously published in the 3rd edition of the *Statistical Record of the Forests and Forest Industries of Canada* plus several additional tables.

1815. **Wood is wealth.** *Bull. For. Br. Can.* No. 105, 1952. pp. 52 + 1 map. 25 refs.

Presents data on the forest resources of Canada, the forest industries, transport, foreign trade, home consumption, labour in the forest industries, and world forest resources.

1816. DUPRÉ CENICEROS, E. **The forest resources of Mexico.** *Proc. UNSCCUR, Lake Success, 1949* 5, 1951 (88–90).

907. *Indirect Significance of Forests (Rural Amenity, National Parks, Forest Influences etc.)*

See also Nos. 954–7.

1817. KLOOT, W. G. VAN DER. **International protection of nature.** *Tectona* 42 (1/2), 1952 (61–78). 12 refs. [E.]

A review of the history of nature conservation from the beginning of the 20th century.

1818. JOVOVIC, N. **The protective functions of forests.** *Proc. UNSCCUR, Lake Success, 1949* 5, 1951 (147–8). [Ministry of Forests, Belgrade.]

Describes briefly the forest situation in Jugoslavia and sketches the plans for research on the afforestation of chalky areas, for planting shelterbelts on the dry, windswept plain of Pannonia and for badly-needed torrent control.

1819. WATERER, R. R. **Protective functions of the forest [: an account of conditions in Cyprus].** *Proc. UNSCCUR, Lake Success, 1949* 5, 1951 (140–2).

1820. MUNNS, E. N. **Protection forestry.** *Proc. UNSCCUR, Lake Success, 1949* 5, 1951 (143–6).

With particular reference to the U.S.A., where the need for more shelterbelts and watershed planting is discussed.

1821. ROMERO, S. A., COROTHIE, H., DELGADO, E., TAMAYO, F., and LASSER, T. **Protective functions of forests.** *Proc. UNSCCUR, Lake Success, 1949* 5, 1951 (148–50).

Discusses measures taken in Venezuela to control grazing, prevent forest fires, reduce the use of firewood and charcoal,and to encourage afforestation.

91. LAND USE, LAND-USE POLICY (INCLUDING AFFORESTATION POLICY)

See also Nos. 1433, 1787, 1818–9, 1821, 1833–4.

1822. KRISHNASWAMY, V. S. **A method to indicate the percentage of land which should be under forest.** *Indian For.* 78 (11), 1952 (537–9).

It is suggested that in mountainous country a slope of 12% should be regarded as critical for erosion and that all land with such a slope or steeper should be kept under permanent forest cover. Such areas may be readily distinguished on a topographical contoured map, e.g. on the Survey of India 1-in. map with 50-ft. contours, areas of 12% slope and steeper will have the contour lines $\frac{1}{13}$ in. or less apart.

1823. WEGENER, K. Los límites climáticos entre la agricultura y el bosque. **[The climatic limits between agriculture and forestry.]** *Cienc. e Invest., B. Aires* 8 (2), 1952 (61–4). [Span.] A.P.B.

Discusses the relationship between climate (especially rainfall) and land use, with particular reference to conditions in parts of Argentina.

92. FOREST OWNERSHIP AND OWNERSHIP POLICY

See also No. 1787.

922. *Publicly Owned Forests*

See also No. 1806.

1824. **Forestry organisation and forest areas under government administration in Australia. (Notes to accompany a map of Australia showing the forest administrative regions and the location of state forests and timber reserves).** *Leafl. For. Timb. Bur. Aust.* No. 62, 1951. pp. 5 + map.

923. *Privately Owned Forests*

1825. DUERR, W. A., and BOND, W. E. **Private forest management in the American 'Lower South'.** *Unasylva* 6 (2), 1952 (59–65).

1826. HASEL, K. Die Mehrnutzungen in den beförsterten Waldungen des Forstbezirks Zell am Harmersbach. **[Excess fellings in the forester-managed [private and corporation] forests of Zell am Harmersbach [central Schwarzwald].]** *Allg. Forst- u. Jagdztg.* 123 (2), 1951 (36–48). [G.]

A statistical, historical study covering the available data from management records from ca. 1836 to 1948.

1827. LUDVIGSEN, F. P. Kan Det norske Skogselskaps takster belyse tilstanden i våre gårdsskoger. **[Can the survey by the Norwegian Forestry Society throw light on conditions in our farm forests?]** *Tidsskr. Skogbr.* 60 (9), 1952 (205–14). [Nor.]

A study of figures from the national survey and from working plans prepared for 1000 farm-forest owners throughout the forest areas of Norway, shows that average volume and increment, both as absolute figures and as % of the normal for the average site class, are higher for the farm forests than for all ownership classes and, in the greater part of the country, for small (0–300 dekare) than for larger (800–1200 dekare) farm forests.

93. PUBLIC SUPERVISION AND REGULATION OF FORESTRY, INCLUDING LEGISLATION FOR THESE PURPOSES

See also Nos. 1802–3, 1821.

1828. CHAMPION, H. G. **Co-operation between state and non-state organizations in the promotion of forestry.** University of British Columbia, Vancouver. 1952. pp. 12. (H. R. MacMillan Lectureship in Forestry, 1952 (2).)

1829. JAMES, N. D. G.; BROWN, J. M. B. **The Chilterns project.** *Quart. J. For.* 46 (4), 1952 (219–27 + 3 photos).

Much of this year's Annual Meeting of the Royal English Forestry Society was devoted to the Forestry Commission's Chilterns Project, launched by them last year to encourage woodland owners in the Chilterns to manage their woods on sound silvicultural lines. As a preliminary to successful management, the problem of naturally regenerating these Beech woods, many of which although small in size are already mature, has yet to be solved.

Among the difficulties are the widely separated seed-years and the heavy growth of bramble which follows any drastic opening of the canopy.

1830. Babé Concer, J. M. Restauración integral y nacional. Aprovechamiento de los montes de propriedad particular. [**A national and integrated rehabilitation policy. Exploitation of private forests.**] II Congreso Nacional de Ingeniería, Instituto de Ingenieros Civiles de España, Madrid 1950, Vol. IV, 1951 (157–68). Numerous refs. [Span.]

Of the 14 million ha. of private forest land in Spain, 5·5 are under high forest or coppice with standards, and 8·5 consist of coppice, scrub or pasture land. All types are generally in a poor and degraded condition. The author summarizes briefly the history of legal measures for the conservation of private forest land, discusses and criticizes the decree of 24 Sept. 1938, and outlines a plan for future state control in the management of private forests.

94. OTHER METHODS TO IMPLEMENT FOREST POLICY

See also Nos. 1828–9.

941. *State Subsidies etc.*

1831. Velay, L. Premier bilan du fonds forestier national. [**A first balance-sheet of the National Forest Fund.**] *Rev. for. franç.* 1952 (10), (613–5). [F.]

An account of the first full 5 years' working. [Cf. *For. Abstr.* 14 (Nos. 908–9).]

1832. Messines, J. L'équipement routier de la forêt et le fonds forestier national. [**Forest engineering works and the National Forest Fund.**] *Rev. for. franç.* 1952 (10), (636–53 + 3 photos). [F.]

Describes the various works subsidized by the French national forest fund during its first 5 years of existence, including in the category of 'équipement routier', besides forest roads, drives etc., other works such as drainage ditches, cableways, fire-breaks, look-out towers, foresters' houses, telephones etc.

944. *Co-operation. Collaboration of Forest Owners*

1833. Parant, E., and Chevalier, Y. Une opération plus délicate qu'on ne pense: la constitution d'une société civile de reboisement. [**More difficult than one might think: organizing a co-operative society for reforestation.**] *Rev. for. franç.* 1952 (10), (662–8). [F.]

Describes the difficulties involved in trying to persuade a number of landowners to co-operate in the replanting of a burnt-over forest in Haute-Marne.

1834. Prax, J. La formation d'une coopérative en vue du reboisement. [**The formation of a co-operative for the purpose of afforestation.**] *Rev. for. franç.* 1952 (10), (669–74). [F.]

Deals briefly with legal aspects and the consolidation of holdings.

1835. Fèvre, M. Les groupements de propriétaires forestiers. [**Associations of forest owners.**] *Rev. for. franç.* 1952 (10), (675–89). [F.]

The history and legal position of co-operative associations of forest owners in France.

1836. Urquhart, B. **Regional forests.** *Scot. For.* 6 (4), 1952 (131–3). 2 refs.

A short review of progress in co-operative forestry in Scotland.

945.1. *Advisory and Information Services. Documentation Centres*

See also No. 1473.

1837. Ford Robertson, F. C. **Forest products and utilization abstracting.** Forestry Commission, London. 1952. pp. 7. (6th British Commonwealth Forestry Conference, Canada, 1952.)

945.3. *Education. Training.*

1838. Holmes, C. H. **Forestry research and education in Ceylon.** *Sri Lanka, Colombo* 1 (33), 1952 (1–8). [E.]

1839. Birch, T. T. C. **The rôle of forest authorities in higher forestry education.** New Zealand Forest Service, Wellington. 1952. pp. 11. 5 refs. (6th British Commonwealth Forestry Conference, Canada, 1952.)

The pre-selection of probationers for higher forestry education by means of forest working experience and a science degree is advocated as a system by which forest authorities can provide for a sustained recruitment of highly trained officers. A more solid grounding in sciences is believed to be a desirable pre-requisite to the teaching of professional subjects, but the prolongation of the training period can only be justified on economic grounds if there is reasonable certainty of the suitability of the students for ultimate professional practice. The staff recruitment and training system followed by the New Zealand Forest Service during the last 13 years is described, with emphasis on the merits of pre-selection. *Author's summary.*

1840. Erffa, Frhr. von. Waldarbeiterausbildung: Übersicht über die Ausbildungsstätten im deutschen Sprachgebiet. [**Training of forest workers: conspectus of training centres in the German-speaking countries.**] *Forstarchiv* 22 (7/8), 1951 (122–3). [G.]

945.4. *Research*

See also Nos. 1089, 1463, 1476–8, 1838.

1841. Weck, J., and Kollmann, F. **Research [in forestry and forest products] in the Federal Republic of Germany.** *Unasylva* 6 (3), 1952 (124–31).

1842. Heikinheimo, O. Metsätieteellinen tutkimuslaitos ja sen kehittäminen. [**The Forest Research Institute [Helsinki] and its development.**] *Metsät. Aikak.* 1952 (6/7; 8), (161–4; 226). [Fi.e.]

An account of its history and suggestions for future development.

1843. Griffith, A. L. **The East African Agriculture and Forestry Research Organisation.** East

African Agriculture and Forestry Research Organisation, Nairobi. 1952. pp. 4. 3 refs.

Reviews the work of 1950 and 1951.

1844. **Annual report on active forest research projects [in Canada] for the year ended March 31, 1952.** Forestry Branch, Ottawa. Parts 1–3, 1952. pp. 124 + 85 + 60.

1845. LESLIE, A. P. **Forest research in Ontario.** *Repr.* from *Canad. geogr. J.* Feb., 1952. pp. 23.

1846. **Research and related services in the United States Department, prepared for the Committee on Agriculture of the House of Representatives 81st Congress 2nd Session, December 21, 1950.** Government Printing Office, Washington. Vol. 2, 1951 (991–1815).

This volume covers current research projects on forests and forest products (pp. 1521–1715) and soils, waters, and fertilizers (pp. 1717–1815). A short history is given of each project and desirable future research is indicated.

1847. AHLGREN, C. E. **A wilderness laboratory in Northern Minnesota.** *J. For.* 50 (9), 1952 (668–70).

A short account of the Quetico-Superior Wilderness Research Station for ecological studies.

1848. **Annual report of the Forest Research Institute for the year ended 31 March, 1952.** *For. Res. Notes N.Z. For. Serv.* 1 (5), 1952. pp. 136.

The greater part of the report deals with the present status of a large number of current research projects.

946.1. *Associations. Societies*

1849. ERFFA, FRHR. VON. Forstliches Vereinswesen im deutschen Sprachgebiet. **[Forestry associations in the German-speaking countries.]** *Forstarchiv* 22 (9/10; 11/12), 1951 (147–8; 180–1); 23 (1), 1952 (17–8). [G.]

Gives, as available, the addresses, chief office-holders, organization, aims and activities, of 38 general and special societies, associations etc., concerned with forestry and the marketing and utilization of forest products, in W. Germany, Austria and Switzerland. Information for E. Germany was not obtainable.

95. FOREST TAXATION

See also No. 1457.

1850. BROWN, J. W. **Recent forest tax legislation in New Hampshire.** *Pap. Mich. Acad. Sci.* 36, 1950 (1952), (85–92). 4 refs. L.S.

1851. ROTHERY, J. E. **A study of forest taxation in the Pacific Northwest.** Industrial Forestry Association, 1410 S.W. Morrison Street, Portland, Ore. 1952. pp. 47. Price $5·00.

Deals mainly with questions of assessment and valuation of second-growth and immature stands in the Douglas Fir region.

96. FOREST LABOUR QUESTIONS, LABOUR QUESTIONS IN WOOD TRANSPORT AND THE WOOD INDUSTRIES

See also Nos. 1237 *et seq.*

1852. Arbetsförtjänsterna i skogarna 1937–52. **[Wages in [Swedish] forestry 1937–52.]** *Skogen* 39 (11), 1952 (228–9). [Sw.]

Gives figures of average wages for felling and transport for the whole country for 1937–52, and for the individual counties for 1948–52.

97. INTERNATIONAL FOREST POLICY AND OTHER INTERNATIONAL COLLABORATION

971. *Congresses, Conferences*

See also No. 1805.

1853. **Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources, 17 August–6 September 1949, Lake Success, New York. Volume V, Forest Resources.** United Nations Department of Economic Affairs, New York. 1951. pp. 325. Price 22*s.* 6*d.*

Contains papers [noticed individually under appropriate subject heads in this issue of *For. Abstr.*] of the sections: forest inventories; protection of forests; forest management; protective function of forests; administration of forests; logging and sawmill techniques; and preservation and chemical utilization of wood.

1854. **Latin American Forestry Commission: report of the fourth meeting, June 16–23, 1952, Buenos Aires.** Food and Agriculture Organization of the United Nations. 1952. pp. 14 + appendices.

Contains discussion and recommendations on the expanded technical assistance programme, the Latin-American Institute for forestry training and research and the forestry training centres, forest policy, recommendations of the sixth conference of FAO, pulp and paper study, the fourth world forestry congress and the international tropical forestry congress, Eucalyptus study tour, tree festival, protection of nature, and standardization.

1855. HEIMBURGER, C. **The Fourth International Poplar Congress in Great Britain and forest tree breeding in Denmark.** *For. Chron.* 28 (3), 1952 (6–23).

972. *Organizations*

1856. **Constitution, rules and regulations of the Food and Agriculture Organization of the United Nations.** FAO, Rome. 1952. pp. 90. [E.F.Span.]

References: 1. *American Nurseryman*, Chicago; 2. *Australian Timber Journal*, Sydney; 3. *British Columbia Lumberman*, Vancouver, B.C.; 4. *Bulletin, International Union for the Protection of Nature*, Brussels; 5. *Bulletin de la Société forestière de Belgique*, Brussels; 6. *Crops and Soils*, Madison, Wis.; 7. *FAO publication*, Rome; 8. *Foreign Commerce Weekly*, Washington; 9. *India News*, London; 10. *Indian Forester*, Dehra Dun; 11. *Journal of Forestry*, Washington; 12. *Landbouwkundig Tijdschrift*, Wageningen; 13. *La-Yaaran*, Nathanya, Israel; 14. *Lumberman*, Seattle; 15. *MLB Log*, Amherst, N.S.; 16. *Nature*, London; 17. *Paperi ja Puu*, Helsinki; 18. *Pulp and Paper Magazine of Canada*, Gardenvale, Quebec; 19. *Skogsägaren*, Stockholm; 20. *Southern Lumberman*, Nashville, Tenn.; 21. *Times*, London; 22. *Unasylva*, Rome; 23. *Wood*, London.

International.

FAO. Delegates from 8 countries took part in the first forestry conference called by FAO in the Near East, at Amman, Jordan (13 20 Dec. 1952). The conference recommended that consideration be given to setting up a regional forest research organization, to promote exchange of information and experience, particularly in the planting of such fast growing species as Poplar, Eucalypts, Acacia, Casuarina and Tamarisk (**7**; Feb. 1953).

Sixty representatives from 14 member governments attended the second session of the Asia-Pacific Forestry Commission at Singapore (1–13 Dec. 1952). Progress reports on forest policy developments since the 1950 session indicated remarkable accomplishment. Several countries (e.g. India, Malaya, Burma and Indonesia) have formulated, revised or extended their forest policy and legislation. Several countries reported the creation of unified Natural Resources Boards or Land Utilization Councils, and progress in the allotment of land to specific use such as arable farming, animal husbandry, and forestry. Japan and India have extended the control of private forestry. Malaya has adopted standardized silvicultural systems for lowland dipterocarp forests. A permanent Committee on Silviculture and Management was set up to form a sub-commission on Teak, make arrangements for a Teak study tour, co-ordinate silvicultural research, and help to prepare for the 4th World Forestry Congress to be held in India in 1955 (**7**; Feb. 1953).

I.U.F.R.O. The Congress of the International Union of Forest Research Organizations will be held in Rome from the end of September to mid-October.

Other bodies: The newly formed International Union of Dendrology held its first conference at Antwerp in September. The aim of the new organization is to include the most eminent dendrologists from each country, and it at present consists of some 50 members from 14 countries (**4**; Dec. 1952).

The thirteenth International Congress for Pure and Applied Chemistry to be held in Stockholm in July–August 1953 is to be restricted to physical chemistry. A symposium on wood chemistry will be held in Stockholm during the same period; it will be divided into 3 sections covering the chemical structure of wood substances, cellulose and hemicellulose, and lignin (**17**; Dec. 1952).

The following conferences have been arranged for 1953:—

International Seed Testing Convention, Dublin, May 23–30.
International Association of Hydrology, Rome, Sept.

Burma. An FAO visiting expert under the Technical Assistance Programme has been investigating the possibility of using inferior Burmese hardwoods, at present not utilized. Samples were sent to Germany, where the extreme difficulty of working these woods, owing to their hardness, twisted growth etc., was overcome by chipping them and reassembling them with synthetic resin to make 'chipboard'. A very strong, light board was produced, and two pre-fabricated houses made of it are being sent to Burma for tests (**7**; Dec. 1952).

Canada. The process of heartwood formation in Douglas Fir is being studied at Cowichan Lake Forestry Station by a member of the Forest Service. Results so far indicate that moisture is of paramount importance in the formation of heartwood and that other factors affecting the change from sapwood to heartwood are pruning and the dominance status of the tree [cf. *For. Abstr.* 14 (No. 1497)] (**3**; Jan. 1953).

The immediate construction of 5 airfields in New Brunswick as the initial step in a plan for spraying a million acres of budworm-infested forest next spring, has been announced by the president of Forest Protection Ltd. The experimental spraying of 200,000 acres last June killed almost all the budworm in the area at the time. Forest Protection Ltd., a non-profit-making, co-operative enterprise was

incorporated in New Brunswick on 6 Sept. 1952. The Government of New Brunswick, and four pulp and paper companies operating in that province are participating (**18**; Oct. 1952).

An arsenic solution (1 part arsenic in 50,000 parts water) used in laboratory tests by the British Columbia Research Council, killed adult teredos in 24 hours or less. The effectiveness of the treatment in protecting log rafts cannot be determined without service tests in sea-going conditions. It is thought that fish would not be affected by arsenic washed out of the rafts, because of the extreme dilution (**3**; Dec. 1952).

China. It has been announced recently that the Kiangnan paper mill in Shanghai has begun to make pulp from Bamboo, using a Russian pulp-soaking method which is said to save production time and give a 12% increase in yield from the raw material (**22**; Dec. 1952).

In north-east China a shelterbelt 1100 km. long and 300 km. broad at its widest point is planned to control drought, blowing sand, and floods. In eastern China another belt, 570 km. long, is planned, to give protection against typhoons. The total area covered by the 2 belts will be 4·5 million ha. Planting began in 1949 and is expected to be completed by 1960 (**19**; Jan. 1953).

Germany. Gramophone records produced in Germany discuss some of the latest forest research undertaken at German research institutes, the rationalization of planting methods, and other subjects of forestry interest. Each side plays for 40 minutes. Records are available in German, English, Spanish and Swedish (**19**; Jan. 1953).

A German firm has developed a new process of manufacturing wood-waste boards which allows complete doors and furniture parts to be made by one operation in the ordinary hydraulic hot press, and cuts costs by 50%. Wood chips, peat, straw or vegetable waste, mixed with urea or phenol formaldehyde resins, can be used for the core, and formed under heat and pressure. Plywood or veneer finishes are incorporated, with wood lippings to provide a firm edge, in one operation. After pressing, the filling is invisible and the article needs only to be trimmed and polished. The product is proof against warp, insect attack and decay, and is fire-resistant. It takes screws and nails like solid wood. If a press is already available the total cost of plant and of conversion to the new process is about £8000. Working a 48-hr. single shift with one press of 8 platens, 3600–4200 doors, according to size, can be produced per month (**2**; Oct. 1952).

Great Britain. In a statement to the House of Commons the Secretary of State for Scotland said that damage caused by the gale of 31 January was mainly in the middle-aged and older woodlands on private estates. In the younger plantations of the Forestry Commission, damage was much less extensive. Estimates of the quantity blown down must be treated with reserve at this stage, but the total for Scotland might be of the order of 30–35 million cu. ft. This figure may be compared with a total amount licensed for felling in Scotland in 1952, of 16 million cu. ft. (including 4 million cu. ft. of hardwoods and 5 million cu. ft. of conifer thinnings) (**21**; 11.2.53).

The Forestry Commission has recently tested a rotary grass-cutter designed for forestry work by Hayters Ltd., of Spellbrook, Bishop's Stortford, Herts. The new model is fundamentally the same as the standard one but is designed to operate in more difficult conditions. The standard model has a total height of 18 in. and can cut right up to tree trunks without damage. The cutting width of a single machine is over 6 ft., and the cutting height is adjustable to 6 in. A special coupling allowing 2 machines to be worked together gives a cutting width of about 13 ft. The cutter is designed for attachment to the Ferguson tractor (**23**; Jan. 1935).

A cargo of Western Red Cedar, a gift from the British Columbia Lumber Manufacturers' Association, has arrived in England, for use in an all-wood hut 16 ft. × 32 ft. and 6 ft. 9 in. high, designed by the T.D.A. The building will be erected in London, probably on a bomb site, and Government and Service officials are to be invited to inspect it. It is designed so that it can be taken to pieces and re-erected anywhere. It is considered particularly suitable for overseas forces stationed in Britain or in Germany (**3**; Jan. 1953).

Haiti. A plan is being made for forest development in the Artibonite valley, including afforestation of 25,000 acres of Government land over a period of 10 years. The Service des Eaux et Forêts, which forms part of the Department of Agriculture and which was formerly responsible for forestry and irrigation, has been split and irrigation has been transferred to the Public Works Department (**22**; Dec. 1952).

Iceland. The chief research officer of the U.S. Forest Service in Alaska recently visited Iceland to confer with foresters there on a tree-planting programme. Spruce and Hemock seed from Alaska has already been sown in Icelandic nurseries (**14**; Nov. 1952).

India. The Assam Government has started operations on a land reclamation scheme designed to bring into rice production 13,000 acres of forest in the Kaki area. Until 1949 the area was a reserved forest; it was then de-reserved and about 1800 families were allowed to settle in it. Progress in cultivation has been so slow that it has now been decided to reclaim the area at Government expense by mechanized operations, and provide roads, water etc. for settlers (**9**; 17.1.53).

The Himachal Pradesh Government has a comprehensive scheme for land reclamation and soil conservation, and proposes to introduce a measure called the Himachal Land Development Bill, designed to protect the catchment areas of the Jumna, the Sutlej, the Beas, the Ravi and the Chenab. Afforestation of 20,000 acres will be carried out during the next 4 years (**9**; 19.11.53).

The formation is announced of a Timber Dryers' and Preservers' Association of India. Its objects are (1) to promote the use of seasoned and preservative-treated wood, (2) to bring together all those interested in the use of such wood, (3) to promote research on methods of seasoning, fireproofing, preservation etc., (4) to train technicians and (5) to prepare and supply plans, estimates, details of organization etc. for wood-seasoning and preservation units. Further details can be obtained from Dr. A. Purushotam, Wood Preservation Branch, Forest Research Institute, Dehra Dun (**10**; Nov. 1952).

Israel. Two species, *Acacia seyal* and *Tamarix macrocarpa*, not known to occur naturally in Israel, were found growing in the desert area of Wadi Araba (**13**; Feb. 1952).

Japan. About 135 small trees have been sent by air to Japan by the American Association of Nurserymen to help establish a 'Forest of Peace' at Tokyo. Similar gifts are being sent from other countries at the request of the Japanese Government (**1**; 15.12.52).

Mexico. The recently incorporated Instituto Mexicano de Recursos Naturales Renovables will serve as a co-ordinating agency for all relevant activities in Mexico, and its functions will include the study of conservation problems and campaigns for the information and education of the public. An early undertaking will be an inventory of renewable resources (**11**; Dec. 1952).

Netherlands. The 'Stichting tot verbetering van voortkwekingsmateriaal van houtopstanden' [Foundation for improving stock for forest stands] has been formed and will include among its activities the work previously done by the 'Werkgroep voor de selectie en veredeling van de groveden in Nederland' [Committee for the selection and improvement of Scots Pine in the Netherlands] [cf. *For. Abstr.* 14 (No. 1137)]. Three committees have been established: for avenue trees; tree seeds and forest plants; and imported tree seeds. The administration is at Utrecht, the technical side and the secretaries of the committees being at Wageningen (**12**; Dec. 1952).

Sweden. A small speedy log-barker called the Skoglund barking machine is said to be able to strip bark from logs of less than 12 in. in diameter without loss of wood at a rate of 2000 ten-foot logs/8-hr. day. The feed mechanism is so arranged that logs of small diameter are automatically barked faster than larger ones. Feeding speed can be varied from 33 to 80 ft./min. A conveyor belt clears the bark well away from the machine. The barker is mounted on rubber-tyred wheels for ease in moving from one operation to another (**15**; 10.1.53).

Turkey. The International Union for the Protection of Nature has made representations to the Turkish Government in order to preserve a remnant of *Liquidambar* forest, a relic of the Tertiary period, situated south of the city of Mugla in the warmest part of Turkey. It was threatened by the proposed draining of the Mugla marsh (**4**; Nov. 1952).

Union of South Africa. A new fibreboard mill near Durban is now in production and is manufacturing finely processed fibreboards from *Eucalyptus saligna* grown in Zululand. At present the board is used mainly in the building and furniture industries but it is in growing demand for many other purposes such as flush doors, floors, cabinets, coaches, caravans, and shop fittings (**8**; 8.11.52).

U.S.A. The rapid expansion of knowledge of the natural plant-growth substances and the successful practical application of closely related synthetic chemical homologues in agriculture and horticulture, have brought with them the usual difficulties of terminology. A study committee of the American Society of Plant Physiologists has, for the past two years, been drawing up a new classification to embrace all 'chemical regulators' in plants (**16**; 3.1.53).

Research in forest tree physiology using radioactive isotopes will be carried on for another year at the University of Idaho Experiment Station. Particular subjects of study are the translocation of nutrients, especially Ca and P, in White Pine. The principal object of this research is to determine

whether pole blight is a nutritional problem originating in defective translocation within the trees (**11**; Nov. 1952).

Planting is being carried out by the U.S. Forest Service under contract to the Savannah River Operation Office, Atomic Energy Commission, near the Savannah River Plant. A total of 30,000,000 Pine seedlings will be planted by hand and machine on about 30,000 acres. The current programme is for 10–11 million seedlings, which are being planted by machine on 11,000 acres; planting began in December and abount one-third of the seedlings have been planted. Seeds are collected locally, tested, and sown at a U.S. Forest Service nursery; seedlings sent for planting are 9 months old, and 12–16 in. tall. Plantings are at present made on open fields. Longleaf Pine is planted on the drier sites, and Loblolly and Slash on land with a higher clay content. Some hardwoods may be planted later (**20**; 15.1.53).

Fifty mills using Walnut timber and 200 Walnut-timber buyers and log producers are co-operating in collecting a million and a half walnuts to be shipped to state nurseries from Kansas to Virginia and from Michigan to Tennessee. All walnuts received at the state nurseries are hulled and given a floating test. Good ones are either sown in seedbeds to give 12- to 18-in. seedlings ready for planting over a year later, or are stratified and are then ready for direct sowing the following spring. The seedlings and stratified walnuts are distributed, at a nominal charge, to farmers and forest land owners through county agents, farm foresters, the U.S. Soil Conservation Service or the State Forestry departments. Over 8,500,000 walnuts have been collected in this way since the programme began 8 years ago (**20**; 15.1.53).

Two new varieties for shelterbelt planting have been developed in S. Dakota. One is a Cottonwood resistant to the rust that has attacked this species in that state. The other is a new strain of Siberian or Chinese Elm which prepares itself for the severe Dakota winters by 'hardening' in October as native species do. This is a great advantage, since the older types of Chinese Elm keep their leaves and remain green until the killing frosts of the late autumn (**6**; July 1952).

An aerial survey known as the BD–BB (blowdown and barkbeetle) Project made during July and August 1952, to provide data for a salvage programme, showed that the total loss in western Oregon from the previous winter's blowdown and Douglas Fir beetle attacks in 1951, amounted to ten thousand million bd. ft. (**14**; Nov. 1952).

In October, 4000 acres of fast-growing Pine belonging to the Southern Lumber Company of Warren was destroyed by fire. Just over a month after the fire the area was re-sown from a specially equipped aeroplane flying at 150 ft. The project took 6 days and cost about $6·0/acre, compared with an estimated 3 years and $12·0–15·0/acre for planting by hand. The Pine seed was distributed at a rate of 1 lb., mixed with 5 gal. hardwood sawdust/acre. Efforts are being made to salvage the fire-killed timber (**20**; 15.1.53).

Porcupine damage to trees in the North-West is reaching serious proportions, and sportsmen are being asked to practice their marksmanship upon these animals. The marked increase in the species is attributed to heavy reductions in the population of its chief enemy, the fisher, a large, powerful marten which is trapped for its valuable fur. A single porcupine can, and often does, damage or kill as many as 100 trees during a winter (**11**; Nov. 1952).

A boat designed by a naval architect to replace the boom-man in arranging the logs in a boom is all steel, oval in shape, and measures 16 ft. by 8 ft. 3 in. It is handled by one man using a steering post. It has been in use at the Coos Bay branch of the Weyerhaeuser Timber Company for some months (**20**; 15.12.52).

Compressed air bubbling up through $\frac{1}{32}$-in holes bored at 80-ft. intervals along a 1200-ft. pipeline at the bottom of a log pond in Idaho, kept an area of 200 × 1200 ft. free from ice at temperatures of 26° F. below zero, although ice elsewhere was so thick that it would carry a team of horses (**3**; Jan. 1953).

A new all-wood army-truck body has been designed and built by the Timber Engineering Company research laboratory, the first of 3 different designs, to be mounted on a $2\frac{1}{2}$-ton chassis and tested by the Army. The one-piece U-shaped, bent, laminated frame-members of the Black Gum veneer extend down one side, across under the bottom and up the other side. The side and floor panels, of solid Red Oak and edge-glued, are easily removed for repair or replacement. All wood parts have been impregnated to prevent insect damage or decay, and treated with a dimensional stabilizing chemical to reduce shrinkage and swelling. The adhesive used is waterproof. The wood, adhesive and protective treatments will all stand extremes of temperature (**20**; 15.12.52).

Venezuela. The Faculty of Physics and Mathematics of the University of Andes, Merida, in 1948 established a school for forest engineers, which has now been raised to the status of a faculty. The possibility of making Merida the centre of the Latin American Forest Research and Training Institute is now under discussion (**22**; Dec. 1952).